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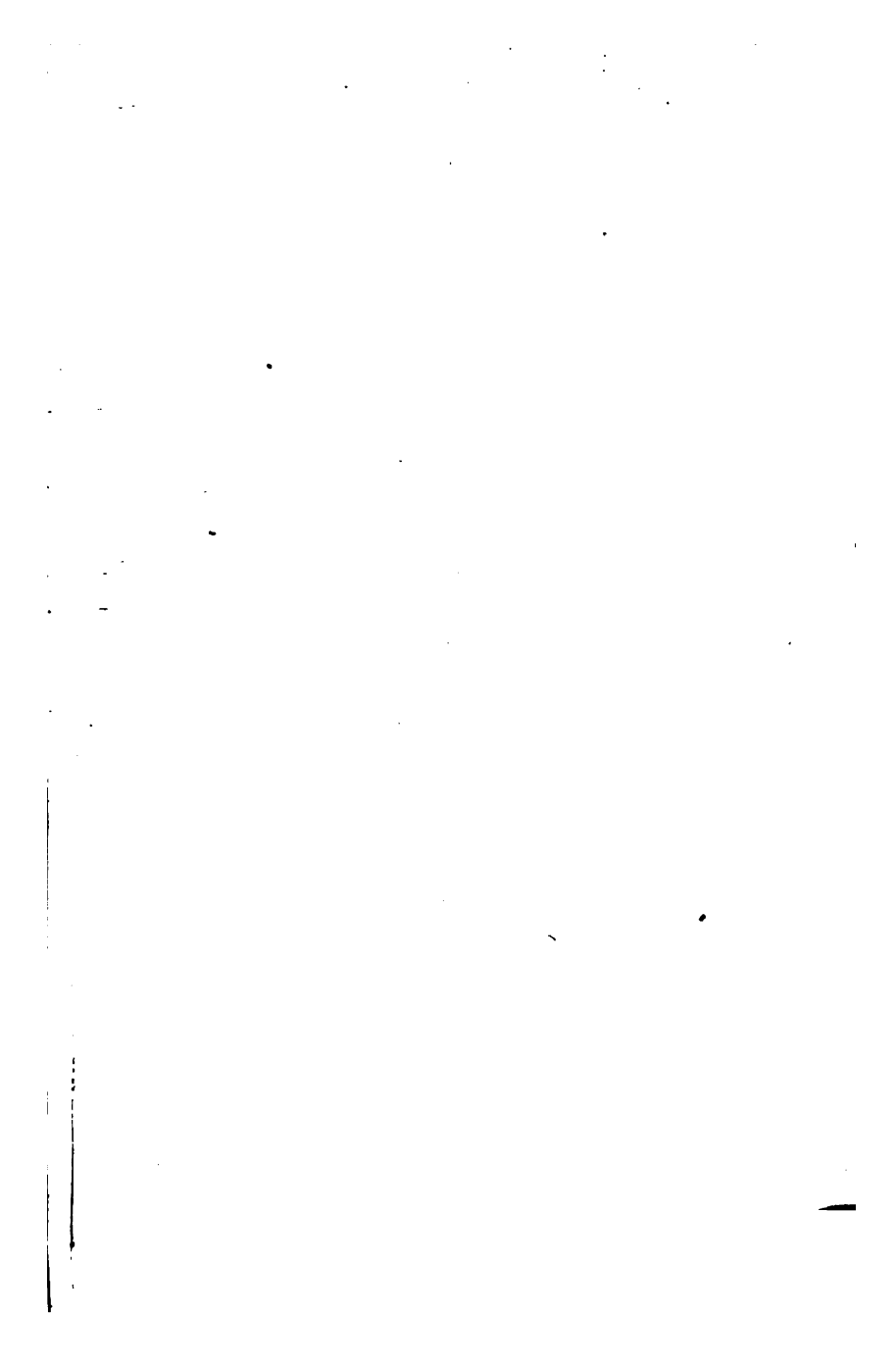
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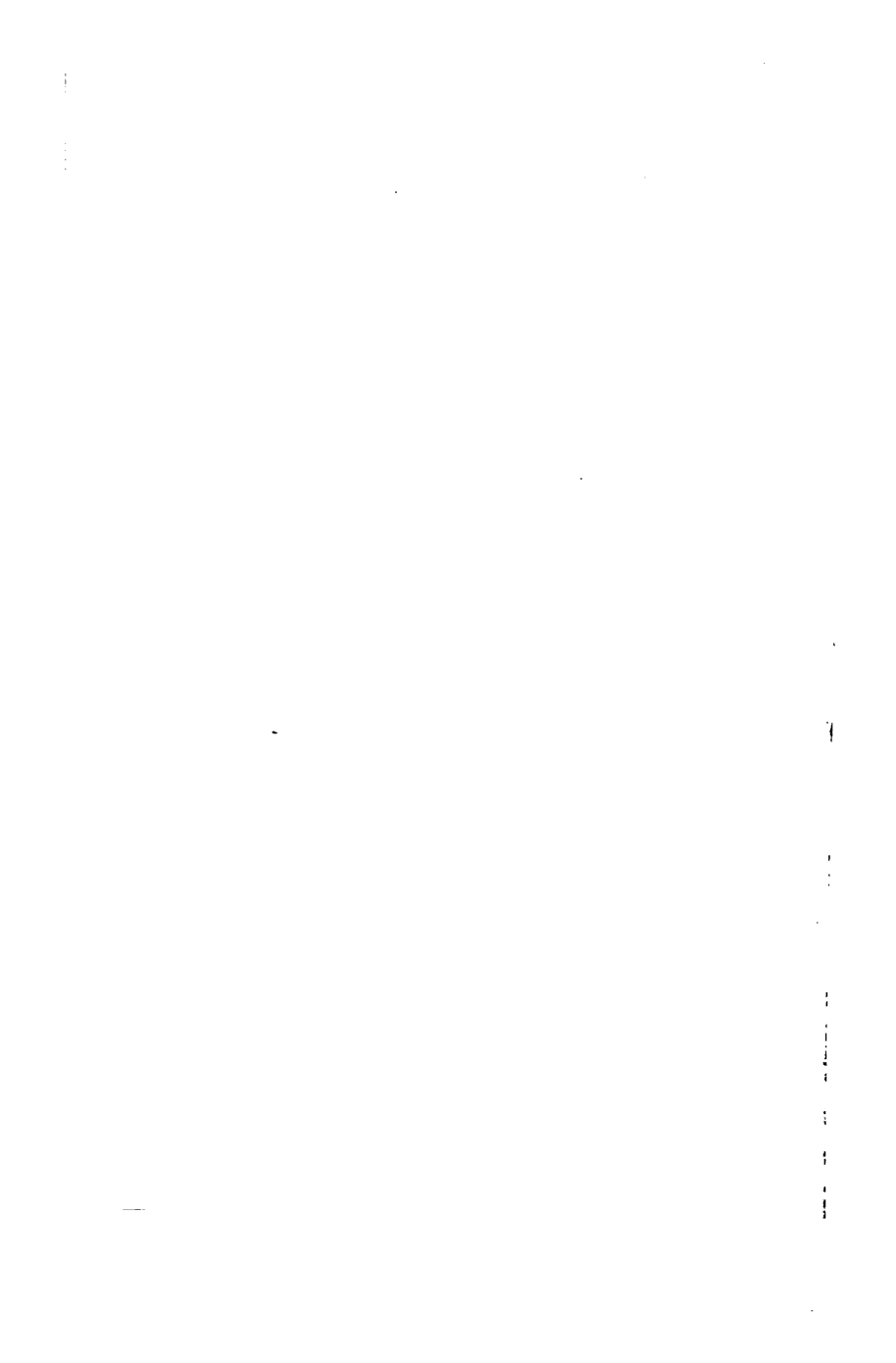
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MANAGEMENT

The Principles Which Underlie
Modern Industrial Administration

Being the Sixth Unit
of a Course in Modern
Production Methods

BUSINESS TRAINING CORPORATION
NEW YORK CHICAGO

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Course in Modern Production Methods

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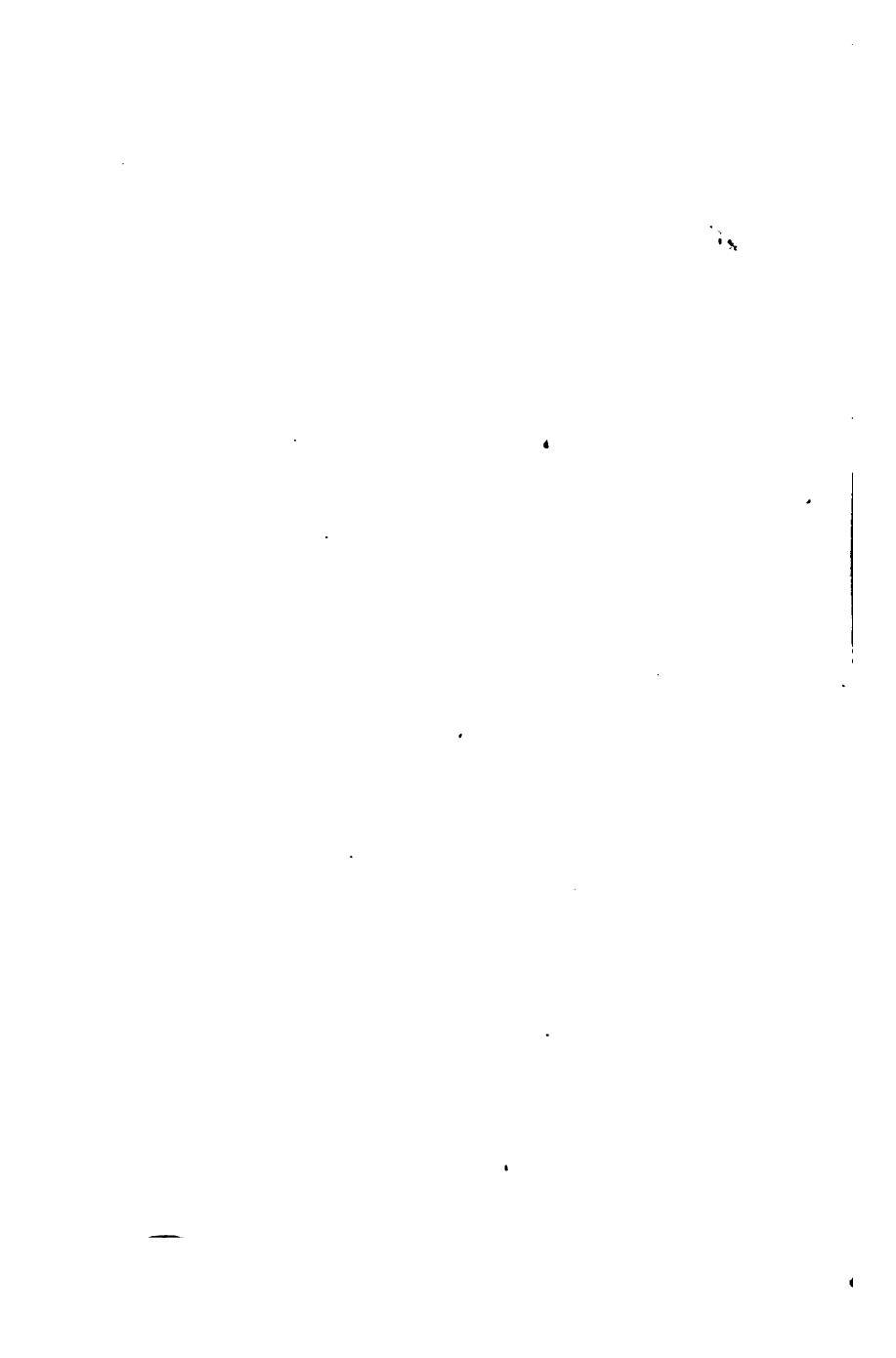
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**The text of the Course is issued in six
units as follows:**

- I. Team Leadership**
 - II. Handling Men**
 - III. Organization**
 - IV. Handling Equipment**
 - V. Production Records**
 - VI. Management**
-

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PREFACE

To get a complete grasp of modern production methods, we must finally look at the subject from the point of view of a plant manager or higher executive. We must see industry in the large, as a balanced teamwork, led and controlled and made effective by management.

When we come to study the principles of management, however, we find that they are basic truths which the foreman can use with advantage in the management of his department as well as the general manager in his direction of the entire works. Thus management is a universal function in industry, and comprehends all the other functions. It is not some mysterious force to be employed only by the initiated, but is a universal function that can be exercised by any man intrusted with responsibility for the getting of results.



I

What Is Management?

A FEW minutes after the quitting whistle sounded its welcome blast to the workers of the Prentice Products Company's factory, there was a tap on the door of Mr. Prentice's office. "Come in," said the general manager, and then as the door opened he added, "Come right in, Reiman. Have a seat. I'll be through in about two minutes now, and then I'll be with you."

Ben Reiman took the seat indicated. To tell the truth, he was a bit "up in the air," as he put it. This was the first time he had ever been in the big boss's office, and he didn't know why he was there. Glennon, the superintendent, had stopped by his bench in the afternoon and said that Mr. Prentice would like to see him after hours. He had obeyed the summons, and while he could think of nothing in his work that merited a call-down, he was naturally curious to know what was coming. In these circumstances one usually fears the worst.

*On the
Uneasy
Seat*

He did not have long to wait. After a

few moments Mr. Prentice turned from his desk.

"Reiman," he said, "we are going to put on a new foreman in the finishing department, and it strikes me that you are the man for that job. I want a live wire who isn't too much alive to do a little quiet thinking and planning, a hustler who isn't too much in a hurry to keep his temper and cultivate the good will of his men, and a man we can depend on to cooperate heartily with the other departments. What do you say? Does the job interest you? You've been working in that department three years now, so you know the lay of the land and the organization you'd have to work with. Would you like to tackle it?"

"I sure would," answered Reiman, his face a broad grin.

"It's a man-size job, Ben," came back the general manager with a good-natured smile. He liked this young fellow, and had kept his eye on him ever since Reiman, a year before, had suggested a new method of routing work from the finishing room to the shipping department—a method that had resulted in the saving of considerable storage space. "I've got a lot of confidence in your alertness and ability," went on Mr. Prentice. "Otherwise

I wouldn't have mentioned the job to you. But at the same time, Ben, it's no cinch that I'm handing you. It's going to call for the best that you have. And it will show you up, Ben, and prove mighty soon whether you've got the stuff of a manager in you or whether you are just a follower."

"I know it's a big job, Mr. Prentice," answered Reiman. "I feel proud that you've picked me for it, and I'll certainly buckle down and be the finest foreman I know how to be. But a foreman is just a sub-boss, isn't he?—and has to be a follower of the management, doesn't he? He's not a manager himself, so far as I can see."

"There's where you are dead wrong, Ben," interrupted Mr. Prentice. "And a whole lot of other people are wrong on that point, too. What is management? What is a manager? Management is the directing of activities; and a manager in industry is one who directs work. *Management Is the Directing of Activities* Is there any executive in the factory who is closer to the actual work and workers than the foreman is? I might be ever so fine a fellow personally and an A-1 plant manager, and Mr. Glennon might rank 100 per cent as a superintendent; but how far do you suppose we'd get in directing the production, if we didn't have the brains and skill and leadership

of the foremen as partners with us in the management?

"Of course a foreman has to *cooperate* with the whole management. He can't play a lone hand. Some people seem to think that a foreman is a sort of automatic go-between. He takes his orders from above, he passes on those orders to the workers under him, and that's



"We expect the foreman, like the top sergeant of a fighting company, to be a leader of his men"

all there is to it—so these people think. But my idea is different. And that's why every new foreman in this factory is first called in here for a quiet little chat with me. I want him to know what I mean when I make him foreman.

"I mean that he is a part of the management of the Prentice Products Company. He is one of the directing forces in this business. He is the responsible head of his department, and we expect him, like the top sergeant of a fighting company, to be a leader of his men. We expect him to be a leader of his men not only in getting out the production, but also in helping those men to increase their efficiency, in keeping them loyal members of our organization, in reducing labor turnover

in improving methods of operation, and in generally increasing the efficiency of our production.

"But he is more than merely the head of one department. The general policies of the management are largely affected by the conditions existing, the problems arising, and the records made in the departments. We are no stronger than our weakest link. If the finishing department can't keep abreast of the processing departments, the work of the whole plant is handicapped. If the processing departments turn out uneven goods, or goods of a quality below your standards, the work of the finishing department is handicapped. If the purchasing department gets inferior material, all of the production activities get a set-back. So you see it isn't a matter of each foreman being king-pin in his own little department. We have to work together. We have to cooperate in the management just as truly as the workers in a department have to team-up in the operation.

*The Foreman's
Part in
Management*

"Management, to be efficient, cannot be a cut-and-dried affair. It isn't possible to adopt some system, wind it up like a clock, and expect it to go on and on. Nor can it be a one-man affair. There must be somebody at the head, to be sure, to make the decisions af-

fecting policies and general plans. But this somebody can't know everything, and his decisions will be only guesses unless they are based on the experience and careful thinking of the men nearest to the problems calling for decision. On all problems of equipment, improved methods of operation, and the handling of workmen, the nearest and most responsible authorities are our foremen. I want to know what they think before I decide the matter. And when I do arrive at a decision, it is part theirs."

"But you do the deciding, Mr. Prentice," put in Reiman. "Where does the foreman's responsibility come in?"

"He is responsible for the sort of information and opinion he gives me," answered the general manager. "If it proves that his information was not accurate or if

***Judgment
Based on
Experience and
Careful Thought***

his opinion is shown by experience to be merely a guess, and not the result of careful thought, I don't hesitate to put the responsibility where it belongs. That's why I expect all the foremen to keep their eyes wide open, not only in their own departments, but throughout the plant. I want the benefit of their best knowledge and judgment on everything that comes up affecting production. I want them to suggest improvements, to point

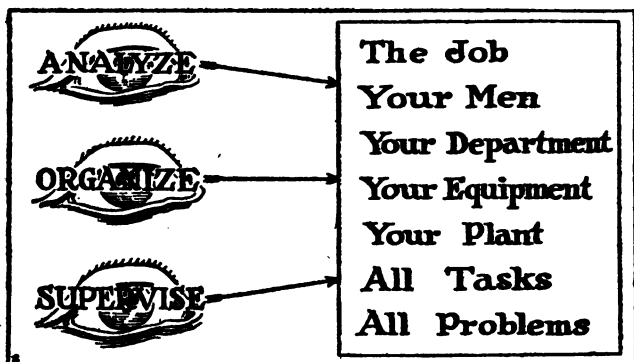
out how equipment may be changed to increase output, to give me the benefit of any new ideas they may get as to labor-saving methods of operation. Nothing in this plant is fixed for good. There isn't a thing here that we won't change, if it can be shown that the change will be a profitable improvement.

"Moreover, there are lots of decisions that cannot be put up to Mr. Glennon or to me. Problems, questions, new conditions arise unexpectedly out in the work rooms and have to be settled right there on the spot. The foreman has to do this deciding unaided. And I'll tell you, Ben, a man has to keep his wits about him to meet many of these issues. They call for real managing ability. Problems in handling men, in handling material and equipment, in straightening out the kinks that occasionally bob up in spite of the most careful planning—you've got to be more than a go-between to get away with it successfully.

"I said a few moments ago that management cannot be a cut-and-dried affair. That is true. But there are certain principles that are the rock-bottom foundation of all successful management—*The Three Eyes of Management* principles that you can use in handling every sort of management problem. One of my engineer friends has called them the 'three eyes of management.' They are

(1) Analyze, (2) Organize, (3) Supervise. If you've got any task to do, any problem to face and solve, any emergency of any kind to meet, I think you'll come off successful, Ben, if you apply the three principles.

"First, *analyze* the thing. Take it to pieces. See what's in it. Usually such a dissection will not only point out the weak spots, but will



The Three Eyes of Management

give a hint as to how the difficulty may be solved. Follow up this hint, see just how it compares with other possible ways of doing the thing, and finally decide which in your judgment is the right way. Then you are ready for the second step, that of *organizing*. This calls for planning—planning the details of your method, planning the arrangement of the equipment to be used, and also planning the number and arrangement of workers

necessary. In other words, organization may include the organization of working methods, of equipment, or of workers themselves, or of all three. The final step is the putting of plans into effect, and it calls for *supervision*, for careful checking up of results with schedules, for leadership.

"There isn't a single problem of production, whether it be some minor departmental problem of a foreman or some big critical problem of the president's office that cannot be solved by this method *The Scientific Method of Management*—provided, of course, that the method is faithfully applied. Analysis doesn't mean just giving a thing the 'once over.' Organization doesn't mean a haphazard throwing of things together. And supervision doesn't mean giving orders and walking through the shop twice a day on inspection trips. No sir, management calls for a man's very best thought and energy, and the proper use of this method of management involves real brain power. And yet it's simple. It simply means finding out all the facts, then organizing a plan of action and the means to be used, and finally supervising the plan through to completion. No hocus-pocus there. No mystery. Just a plain, straightforward, scientific method of doing things."

"It sounds sensible," said Reiman. "In

fact, Mr. Prentice, that's just the sort of thing I did in sizing up that congestion of stuff in the finishing room last year. It seemed to me to be a waste of good space, and it certainly wasn't doing any good to have stock standing around that way. So I just asked myself all sorts of questions about that stock. Some of it was for early shipment, I found. Some of it was to go to the stock room. And some was spoiled or defective, and had to be sent upstairs again. Just as you say, I took the problem to pieces. And when it was all open, and on the table, as it were, there wasn't much trouble in putting my finger on the weak spot that was clogging up the system. This pointed the way to routing the stuff for shipment direct to the shipping room, and with that out of the way the rest was easy."

"Yes, Ben, you've got the idea. That's it. That's the method of good management. That method will pull you out of the hole many a time down there in the finishing room, when you find the difficulties piling up. And if you use it faithfully, I think most of the difficulties will be ironed out in advance. But don't forget the plant as a whole, and the fact that you are a part of its management. You are not only foreman of the finishing room, but you are one of the foremen of the

Prentice Products Company—one link in its chain of management.

“Management is a mighty big subject, Ben, and an absolutely essential function in industry. It isn’t hard to get the capital with which to equip a plant or the workers to man it, provided *How Management Is Valued* you have the right sort of management at the helm. James Dill, who as a big corporation lawyer had a finger in organizing some of the biggest companies in the country, said that he could gather together a million dollars of capital ten times over, while trying to find a man capable of managing the industry represented by a million dollars. And Charles Schwab remarked that whenever the question of buying a new plant comes up, it is not a question of getting the money, but always one of getting capable men to manage it.

“Therefore, Ben, I am putting the emphasis in the right place when I put it on management. For the man who is ambitious and really capable, there is no finer opportunity in industry than that open to him through the foremanship. There you have to deal face to face with all the industrial problems—the problems of labor efficiency and turnover, those involved in handling men, the problems of proper coordination of equipment, of re-

ducing waste, of utilizing idle resources, of cutting production costs without discouraging production. Various schemes of management have been worked out and applied in industry. It will pay you to study them, to see how far you may use them in your own work. Also the experience of others in this field may save you from making their mistakes.

"In all your study of methods and systems and principles of management, be careful to test them in the light of your own needs. Ask personal questions. How does it apply to my own department? How will it fit in with the organization of our work? Will it reduce the cost of production in any particular? Will it save time, or reduce spoilage, or safeguard material? Will it be a spur to production? Will it help reduce labor turnover? Will it cost less than it will save or earn? Practical questions such as these get at the heart of the matter in a few moments, performing the first step in the scientific method of management, and will indicate to you whether the suggested idea or system or device is worth adopting. Moreover, they make you study your own department or job, which is always a good thing to do.

"And now," said the general manager, rising, "I've said my say. I'm glad to have you step up from the ranks, Ben, and become a

part of our management. I simply wanted to give you a little view of how I value the job I'm intrusting to you, and the sort of opportunity I think it is for a young man of your capabilities. We're partners together in production here in this plant. That's all."

II

Using the Scientific Method

AN excellent example of how the scientific method was used by one general foreman in handling a baffling labor problem is given in the experience of a Chicago factory.

*Going After
a New
Labor Supply*

The plant was a large one in which male labor had been exclusively employed, but with the serious man shortage due to entering the war it became necessary to look for other sources of labor. Investigation showed that the box-making department was well adapted to the employment of women workers. The work was light, the labor conditions were easy, and in fact many other plants were employing women in exactly the same kind of work. A rest room and other service facilities were accordingly installed, a wage-scale fixed on, and the plant began to advertise in the "help wanted—female" columns of the newspapers.

There were plenty of replies to the advertisements. Inside of a week a full force had

been engaged for the department, and the work was progressing satisfactorily. But after a couple of weeks on the job, many of the women dropped out. More were hired, but as fast as the departing ones were replaced, new vacancies appeared. It got to be an almost continuous performance, and soon the general foreman realized that the high labor



As fast as the departing ones were replaced, new vacancies appeared

turnover in this department was seriously handicapping its efficiency, as well as burdening it with a heavy expense. Finally, one day, he called the company's woman supervisor into his office.

"See here, Miss Holt," said the executive, "probably we've been going at this thing one-sidedly. We've been advertising for women workers, we've been interviewing them and hiring those that seemed suitable — and everything we've done has been from our

own standpoint of getting workers. Suppose we look at the problem from the other side also. We want workers. What do the applicants want? What do they want that we are

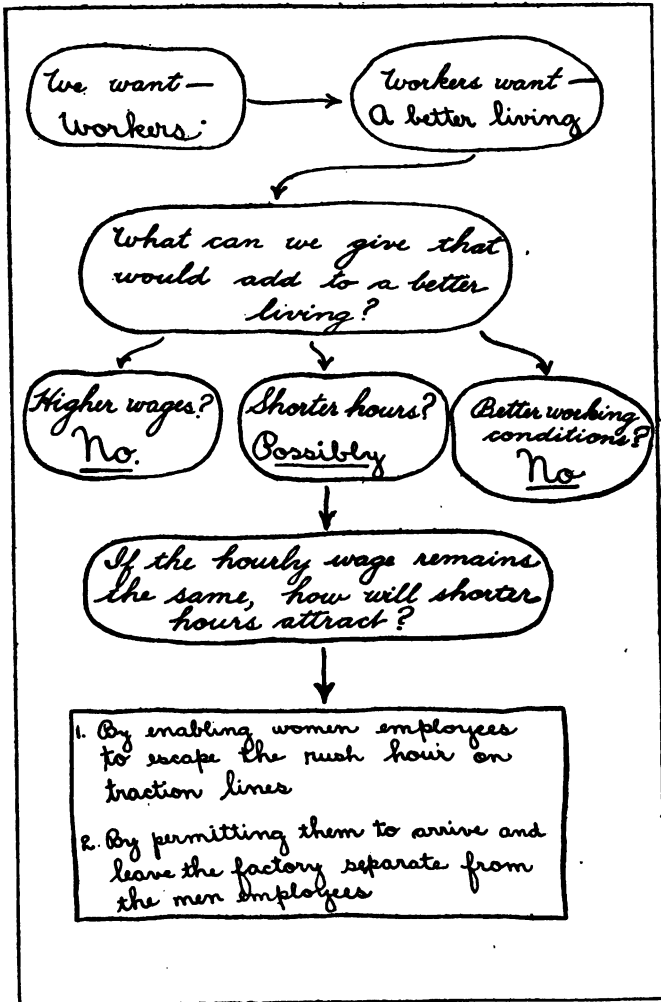
*Tackling a
Problem from
Both Sides*

not giving them? What do they want that we can afford to give them? We are not only buying labor, but selling jobs. How can we sell them so that they will stay sold?"

The general foreman was a great hand at charting the problems that arose in his plant, so now he took a piece of paper and with Miss Holt's assistance began to analyze the employment problem, tackling it from both sides, and putting down on paper the steps of his analysis. The complete result finally worked out into the chart reproduced on the opposite page.

Examine this chart and you will see how the analysis works back and forth between the point of view of the employer and that of the

Analysis— employee. It takes the whole problem to pieces, finds out the possible
Getting at the Root of the Matter appeals to women employees, and picks out the one that is most likely
to succeed. The factory wants workers, the workers want a better living. What elements, that the factory may supply, enter into a better living? The answer is (1) better wages, (2) better working conditions, (3) shorter hours. Then the analysis proceeds to consider each of these. Can the factory pay higher wages? No, its wage-scale is now higher than the average rate for such work, and any increase would boost production costs



HOW THE FOREMAN CHARTED HIS ANALYSIS

dangerously high. Can the factory better its working conditions? Miss Holt answered that she knew nothing lacking in the way of proper conveniences and comforts. The equipment was first-class. The factory rooms were clean and well-lighted. Facilities were adequate in every way, and compared favorably with those of other plants employing women. The only complaint that had ever been made, Miss Holt said, was that the factory was inconvenient to reach. It was situated in a crowded business district, and most of its employees had to travel some distance on the elevated trains and surface cars. Of course it was out of the question to consider moving the plant, or trying to provide housing facilities in its neighborhood. Thus the inquiry was narrowed down to the third element. Can the factory reduce its hours? The general foreman answered that it could, if necessary. How would a reduction of hours affect the women workers, provided the per-hour wage-scale remained the same? Miss Holt answered that it would probably appeal to them favorably, if the working day were so arranged that they could avoid the late afternoon rush hour on the elevated and surface lines. In fact, she thought that some readjustment here would meet the objection to the factory's location.

Also, now that the subject had been mentioned, she remembered that some of the girls had complained of the crowding at the entrance to the plant at the morning opening hour and evening closing hour. If the box-making department were put on a schedule of hours slightly different from that of the other departments, the women workers could enter and leave separately from the men workers; and their arriving and leaving time might be so arranged that they would not have to breast the human tidal wave of the rush hour on the transit lines.

The general foreman considered this proposal thoroughly and decided that it was entirely feasible. He could shorten the working time a half-hour at each end without seriously cutting into his production. The employees were paid on an hourly rate, so there was no increase in direct labor cost. The equipment used in the box-making department was simple, so there was no big problem of equipment idleness. Anyhow, the labor turnover was costing so much that any reasonable measure that promised to bring it down was worth a trial.

Thus, by the process of analysis, the foreman and his assistant got at the root of the problem. The next step, in the scientific method, is organization. So they proceeded

to that—to plan a new arrangement of hours for the box-making department, an arrangement that would get the desired result with the minimum reduction of the working day, and to have this plan approved by the works manager.

**Organization—
Planning the
Way Out**

After a suitable arrangement had been decided on, there remained the final step in the process—putting the plan into execution.

**Supervision—
Seeing the
Thing Through**

This called for strict supervision of all details. First, the new plan had to be explained to all the employees in the department and to all new applicants. The advantageous features of it had to be pointed out, so that they would see how it would help them. This is most important—the proper instruction of the persons supervised, so that they may rightly grasp and correctly understand what is being done. Many a fine scheme of organization or method of work has failed because it was not properly introduced and explained to those who were to use it. The good manager is very careful here to “get across” to those under him the meaning and value of whatever is proposed.

Not only was the new schedule of hours pointed out to the women employees as something that had been adopted for their benefit,

but the general foreman saw to it that the schedules were fairly observed and lived up to. Some people are quick to take advantage of any liberalizing of the work requirements. If a plant adopts some measure in deference to the interests of its employees, such people promptly assume that the management is an easy mark. The only way to nip such influences in the bud is to require strict conformity to the plan as organized. Such a policy is not only correct discipline, but it is absolutely fair treatment. It completes the practise of good management.

The outcome of this little innovation in the box-making department was entirely successful. It was quickly proved that this appreciation of a woman's point of view on the part of the employer rated high with the women employees. Within three months, the rate of labor turnover had been cut to one-fourth its former figure, and today there is probably no industry in the country employing women that has more stable labor conditions than the box factory of this Chicago plant.

Analyze, organize, supervise—you can apply this formula to every sort of problem, inside the factory and outside. In your home work as well as in your plant work, you have to manage your tasks, your problems, your opportunities, and your difficulties. If you

don't manage them, they will overmaster you. Management is a function that must be employed wherever results are to be got with economy of time or expense. *A Universal Formula for Management* Even in a highly-organized factory, where everything is carefully assigned and scheduled in advance, the foreman cannot depend entirely on the thinking apparatus of the higher management, but must himself manage his job, if it is to be done effectively. In fact, the man in the ranks, the individual workman, has to exert some managing ability in order to follow instructions correctly, cooperate with others in his department, and get out his share of the production.

In this unit, however, we shall give chief attention to the broad topic of plant management. Our viewpoint shall be mainly that of the head of an industrial concern, charged with responsibility for handling a varied organization, a complete equipment, and of using these facilities for turning out goods at the lowest possible cost commensurate with the quality required. It is important to a full knowledge of modern production methods that we now view the problem of directing industrial activities, not merely from the position of a department head, but from the vantage point of the head of the business.

It is hardly necessary here to go into all the details of the problems confronting the president or general manager of an industrial concern. We can indicate in general the bigness of his job, and the complexity of it, by quoting from a publication of the National Industrial Conference Board which listed the following functions of management:

*Some General
Functions of
Management*

BUYING of materials at the right time, foreseeing market conditions often throughout the world, and deciding how far to go ahead in storing supplies. Questions of foreign imports and the price of exchange are to be mastered.

TECHNICAL PROCESSES—the state of the arts in all countries, the power to decide whether a new invention will be a commercial success, good judgment in adjusting machinery to floor space and sequence of processes, are matters requiring a special training for years in any one industry.

SELLING—to know accurately home and foreign markets, to devise the best selling agencies for a particular kind of product, to know when to sell and at what price, is vital to the continuance of the industry.

FINANCING all operations involved in buying and selling, determining the form of credit, discriminating among buyers as to integrity and promptness of payment, introducing cost accounting, borrowing capital, discounting paper, while dependent on an expert knowledge of banking at home and abroad, require a very exceptional ability among managers.

ORGANIZATION—the capacity to organize an industry

try into a well-knit whole, to know human nature and to have an instinct for selecting the right man for a given duty, to keep all parts of the institution in proper co-ordination, to reserve leisure to think and to keep a grasp on the industrial tendencies of the whole world, is essential to the highest type of an executive.

What does the proper performance of these functions involve? It involves, in the first place, KNOWLEDGE of the *results* aimed for, of the *means* available, and of the *methods* possible to be used. It involves, in the second place, ORGANIZATION of these *means* and *methods* in the *one best way*. It involves, finally, EXECUTION of the plans through the *direction of operations*, the *leadership of the organization*, and the *supervision of work* through to completion. In buying equipment or materials, in selling products, in financing operations, in organizing the company, plant, or working force, in whatever the manager is called upon to do, he must use these three agencies—Knowledge, Organization, and Execution. Knowledge comes as the result of analysis; Organization is planning and systematizing; Execution comes through supervision. Thus we are back at our old formula once more. The manager, whatever the degree of his position, and whatever the nature of his tasks,

must first, last, and all the time, ANALYZE, ORGANIZE, and SUPERVISE.

There is no set system of management. The methods vary according to the size of the plant, the character of its processes, the nature of its production, and other variable factors. What may be good management for a plant employing fifty men at hand work processes might be wholly unfit for a plant equipped with automatic machinery and turning out a single standardized product. What may seem old-fashioned and makeshift, may prove on investigation to be the best sort of method. For example, Belgian linen has long enjoyed a world-wide reputation for fine quality. The manufacture of the linen begins with the flax, of course, and it is the custom in Belgium to put the flax in the river where it is allowed to stand and rot for a certain period. This practice looks pretty crude to the American industrialist, but the fact remains that the operation of the river water in the open air produces a very high grade of linen thread from which the finest fabrics are woven. Probably no other method of rotting out the flax would give such good results with such small expenditure.

But while there is no set system of management, there is a basic principle that is the foundation of all good management. It is

the principle of knowledge, of management organized, controlled, and led in accordance

*Knowledge,
the Basic
Principle* —not with guesswork, prejudice, personal whim, or custom—but in accordance with the known facts.

Earlier units of the Course have discussed methods of sizing-up men, of job analysis, of time and cost analysis. Modern management applies this idea everywhere in industry. Modern management *analyzes* before it *organizes*, and all its plans, methods, orders, rules, instructions, and systems are based on the analysis—on actual knowledge.

This is the very foundation of our present study of the subject. It is the basic principle of all management—of department management and of self-management, as well as of plant management. The foreman can use it with advantage to himself and his men and his plant, as well as the chief in the works manager's office. In fact, the foreman and all others intrusted with any part of the direction of industrial activities must use this principle, if they are to hope for real success.

The term "scientific management" has become associated of late years with a particular *system* of management, also called "functional management" and "task management." By the scientific *method* we do not mean this specific system of management. The scientific

method is the application of the three principles, Knowledge, Organization, and Execution, to the problems of industry. It is everywhere applicable. "Scientific management," on the other hand, is a distinct *system* of industrial organization and operation which has been highly successful in some industries and not so successful in others. *Successful* scientific management uses the scientific *method*, but this statement is not true of all attempts at scientific management. A later chapter will make plain how functional organization is used in industrial management. The purpose here is to avoid confusion of terms—to make clear that the scientific *method* is a basic and fundamental thing that may be used in meeting any problem involved in the directing of industrial activities.

Careful use of the scientific method results in a system of management—and it may be one particular type, or a combination of two or more. The system, as already explained, must in every case be cut to fit the particular requirements. Ready-made systems are rarely a good fit.

By the scientific method all repeated experience with men, things, and schemes in business and industry is observed, criticised, and carefully verified and daily recorded;

and, through reflection and reasoning, is made to yield results wherever they are economically

*Sound System Is
Derived from the
Scientific Method*

justified. The scientific method or principle of verification is as old as Greece but was first used extensively in modern science where every "result" or new truth is a welcome and permanent addition to human knowledge. But it must be applied with caution to the business world where its laborious and expensive investigations should be exercised only on frequently recurring things, and even then can only be justified by the economic utility of the "result."

In facing the actual problems of industry, it is not as a rule necessary or advisable to go into minute details before systematizing actively to some extent. A very comprehensive system takes much time and money to formulate, and is rarely secured "ready-made." The responsible executive or foreman is called upon to produce as well as to ponder, and if he is wise he will hit the obvious high spots of ineffectiveness and lack of system at relatively low cost without delay, leaving the refinements to a later date and probably postponing some of them indefinitely.

The same considerations apply to the multiplication of records in production, costing,

and accounting. It is well to be wise *soon* after the fact. If the enlightenment is too long delayed and unnecessarily detailed, the cost of procuring it may be out of all proportion to its value. A noted engineering expert who was retained to investigate a well-known business said that the man who had designed the recording system of the plant must have had a personal interest in some stationery concern. There were so many useless cards and printed forms that he could account for them in no other way.

The wealth of thought and care exhibited in the recording systems of great insurance, railroad, financial, and similar institutions is wholly out of place in a plant where many things are *quickly over* and done with and of little future interest to the executives. Everywhere the creator of red-tape must be, at one and the same time, encouraged and challenged if the result is to be effective and permanent.

If the development of system is not to be abused, executives must make sure that the economy of any proposed routine is certain. They must oversee the matter and must insure, before costly formulation is started, that well-considered, broad views of their business situation are taken; that all the facts are on record and the departmental systems properly dove-

*System as a
Good Shop Tool*

tailed into one another. This can often be assisted materially by preliminary charting of the proposed routine, which brings out misconceptions as to its details.

In no case should proprietors descend to the level of buying so much magic system from a practitioner who sells it and rest con-



System, like a good fruit tree, should be pruned of all extravagances

tent with the unsupervised efforts of a very ordinary system mechanic sent out to erect the job. As time goes on, every system should be pruned and pared of extravagances so as to attain maximum economy and dispatch. Its cost should be watched carefully and a look-out maintained for suggestions and improvements. It should never be presented to employees as a sacred ark which

no one may touch or as a wholly settled result which may not be questioned. The moment an executive or hired counsel is foolish enough to announce either directly or by implication that all the thinking on system in an establishment will be performed in future by a mind of a higher order, there is much tribulation in store for that mind. Yet system practitioners have occasionally so hyp-

notized the executive authority as to be able to act in this way; but their reign though glorious has been decidedly brief.

It is right to insist that a given routine shall be followed implicitly while it is the prescribed system, but it is wrong to shut the door either deliberately or by accident to proposed amendments by the foreman. Every such action reaches far beyond its apparent field, and the cost of ill-advised conduct of this kind has to be reckoned in large figures.

Modern production methods are built through many systems on one solid foundation: "the truth, the whole truth and nothing but the truth" about all the factors that participate in industry.

When the truth is known and correctly recorded it is a record of experience, and the systematic use of experience, the economic control of effort, and the promotion of personal effectiveness are the objects of all worthwhile systems.

III

How Management Is Organized

A RATHER difficult situation arose for Jenkins, the new machine-shop foreman of the Dix Manufacturing Company. A special rush job had been turned over to him, and instead of following the ordinary shop routine, Jenkins analyzed the job, planned a way of handling it that eliminated many idle steps, and as a result turned out the work in three-quarters the time it customarily would have taken. Mr. Dix, the president of the company, called the foreman into his office to compliment him.

"You did good work, Mr. Jenkins, and I want you to know that we appreciate enterprise and sound judgment on the part of our foremen. But there is one other point, too," added the president.

*A Compliment
with a
String to It*

"I wish you would consult me next time when a piece of special work comes up, and get my approval before you make any changes."

At this remark Jenkins looked up, and his face flushed.

"It's no reflection on you," explained the president hastily. "You are a new man here, and naturally are not yet accustomed to our ways. I don't wish to discourage any rightly-directed initiative, but at the same time I must have the opportunity to pass on all new proposals, and must certainly be informed of things in advance of, not after, the event."

"But I consulted Mr. James Dix, the superintendent, your son," protested the foreman. "I told him how I'd planned the job, and got his O.K. before I started the work."

"Hereafter, please consult me," returned the president. "I want to know what's going on in this shop."

"Of course I haven't any desire to assume authority, and I'll be glad to consult you," replied Jenkins. "But your son is superintendent of this plant, Mr. Dix. How many bosses have I got? If I am to take orders direct from you, what about him? What is his authority? What's more, Mr. Dix, as I recall you were away part of the time last week, when this job was first put up to me. You were in St. Louis, as I remember, at that salesmen's convention—so I could hardly consult you without holding up operations until you got back. And it was a rush job."

"Yes, that is right," admitted Mr. Dix. "But as I said before, Mr. Jenkins, I don't

One-Man Management blame you in this matter. You did well, and I have thanked you for your exercise of initiative and good judgment in putting through a rush job in such splendid time and with such low cost. Don't let's get excited, or misunderstand one another. I simply want to be consulted in the future. When I'm not here my son is in full command, and his decision goes. But when I am here, he is subordinate. As superintendent, my son passes on minor matters of shop direction, supervision, and discipline. But on all important matters, I, as principal owner of this business and its executive head, must be consulted."

"But which are which, Mr. Dix? Don't you see what an uncertainty I am left in? How can I know when the superintendent's O.K. is enough, and when I must come to you for your O.K.?"

"Each matter must be judged on its own merits," said the president. "I think you can generally tell, Mr. Jenkins, and when you are in doubt come to me anyhow."

"In that case I'm afraid I'll always be in doubt," answered the foreman, "and will be coming to you with everything, wasting a lot of your time on details, and when you are busy, holding up work until I can get your decision. My candid feeling is, Mr. Dix,

that authority ought to be clearly defined, so that there is no possibility of a misunderstanding. And I don't feel that it has been here."

The foreman was right, of course. One of the first requisites to good organization is that responsibility and authority be clearly defined. Each executive must know who is under him and to whom he reports. Every man must know what detail of the work he is responsible for, from whom he gets his orders, to whom he goes for instructions, approval of plans and results. Mr. Dix was an old-time gentleman who had started his business in a small way and grown up with it as it developed into large-scale. It hurt him to have to deputize any of his authority, for that seemed to interfere with his control. As a matter of fact, the only way to keep effective control of a large force is through organization of the management in which the duties are deputized. In a modern factory, with its many departments, no one man can keep his eye and his mind on everything. Mr. Dix has since been brought around to this modern point of view, and his son today is superintendent in fact as well as in name. It was the plain straight-from-the-shoulder talk of Jenkins that opened the old gentleman's eyes to the injustice he was doing his son and his own

business by his antiquated ideas of one-man management,

Under some conditions one-man management may be the best kind of management. Where the force of workers is only a few men, or the manufacturing process is extremely simple or performed mainly with automatic machines, it is easily possible for one man to oversee all the work and make all the decisions. But when the industry expands, and becomes departmentalized, no one man can look after all the managing details. Assistants and subordinate managers become necessary. Then there arises the problem of how to coordinate these various links in the management, so that there may be no wasted effort, no looseness of control, no conflict of authority or of functions. The problem then is one of how the management should be organized.

The organization must be based on careful analysis of all the needs and requirements and resources of the business. In other words, organization must rest on correct knowledge here as everywhere else in management. But organization has principles of its own which must be applied both in the analysis of means and methods and in the planning which follows this analysis. These guiding principles of

*Seven Principles
of Organization*

factory organization are seven in number, as follows:

1. *An executive with deciding powers is provided at all points where action must be taken.* Failure to do this opens up the way for vacillation, jealousy, inefficient compromise and disorder. Responsibility divided invites evasion. Your shop jury should never be able to hold an inquiry over an industrial corpse or plant failure and bring in a verdict against some person or persons unknown.

2. *The responsibility of each position is fully and carefully outlined.* A simple chart is often useful in conveying such relations to others and helps to avoid the conflict and lack of cooperation which uncertainty creates. It may take many forms but the chart should not be complicated by showing too much detail. It should be readily understood by any employee. Fig. 1, page 38, shows the organization of a typewriter factory which sends its products all over the world. The numerals in brackets under each division or subdivision indicate the number of employees. Fig. 2, page 54, shows the very different organization of a naval aircraft plant with only one customer, the United States Government, and with no relation to external business except that involved in the purchase of materials and the securing of transportation. Both are

very successful, each using the organization form best suited to its business and also to the people available in each district for executive work and shop labor. The first plant had a nucleus of mechanics born and bred to the business and hundreds of women and young people quite new to it, while the second plant—buildings, equipment and personnel—was a mushroom growth of a single half-year, employing fishermen, housebuilders, and non-descript handy men chiefly, only the foremen and a few workmen having previous acquaintance with the technical details of the work.

3. *The duties of the various organization positions are made to conform satisfactorily to the ability of those chosen to fill them.* This is a most important and often, in reorganization work, a delicate matter with which no influence or special interest should be allowed to interfere. Sometimes those holding the positions must be changed to attain the end desired. At other times it may be necessary to change the organization. Conformity to this condition must, however, be obtained one way or another, and it is the virtue of a reasonable system that it seldom needs to throw away a good man. Experts are sometimes wholly devoid of executive ability and yet may make excellent advisory members of the staff. The surest way to reduce or even to

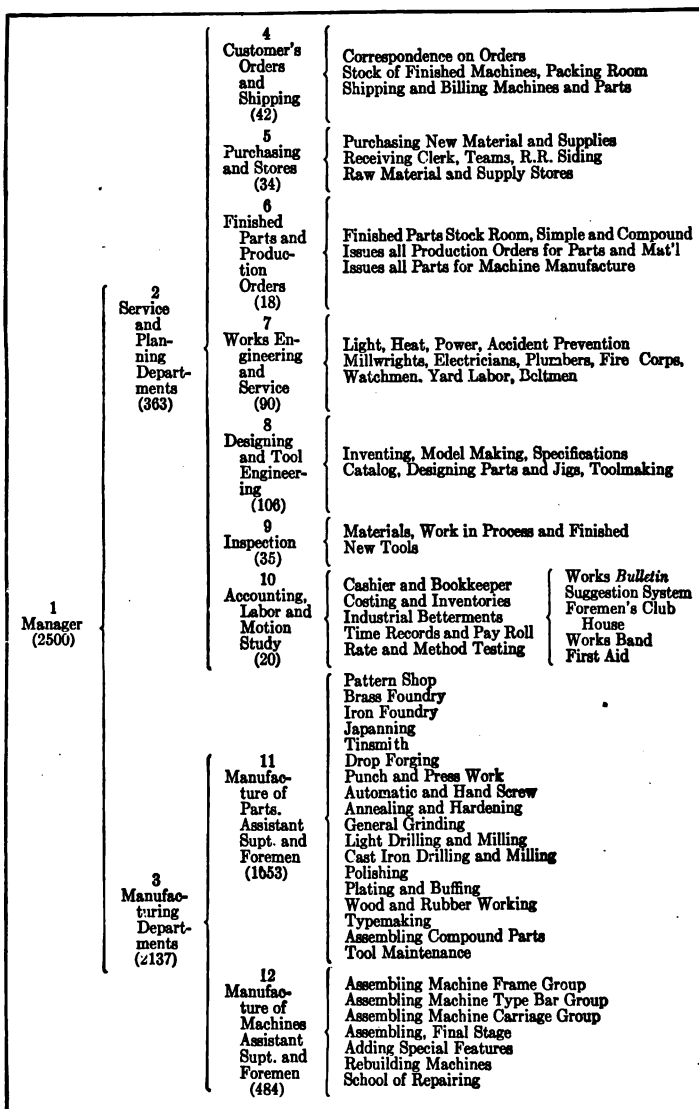


FIG. 1.—Organization of a Typewriter Works

kill the good will of an organization is to stab it in the back by favoring obvious incompetence by the men at the top or by tolerating unjust discrimination by those lower down.

4. *No person is made subordinate to two or more others, if it can be avoided.* This is a frequent source of trouble, ill will and inefficiency, and an inexcusably foolish arrangement.

5. *The power to discipline men in any department is allowed to rest in the hands of the official who is held responsible for results.* All appeals to the higher motives of subordinates are strengthened, not weakened, when they are made by the authority having the power of reward or of punishment. This does not mean that there is no court of appeal, but it does mean that idle tales and snap judgments are not encouraged by the court.

6. *The duties of the members of the organization are distributed so that unequal loading is avoided.* This is necessary in order to make fair comparisons of results. It also keeps the keen worker in the prime of condition and prevents the naturally indolent, though gifted, man from growing rusty or flabby.

7. *Wherever possible, no positions on the staff are created which are blind alleys for the ambitious and permit of no promotion therefrom.* This cannot always be obtained, but

unless it is generally secured, even good men lose interest in their work and become inefficient.

The seven principles are fundamental. It is wise for the foreman to keep them in mind in the leadership of his department, in the delegation of authority and duties to his assistants, and in drawing up recommendations for extensions or improvements.

*The Principles
Affect both
Efficiency and
Human Relations*

These principles not only determine the efficiency of an industrial organization, but they directly affect human relations within it. If they are faithfully observed, there will be no conflict of authority, no duplication of effort, no misunderstanding of duties and responsibilities, no misfits in positions, no "passing the buck" for mistakes or neglect, no insubordination, no complaints of favoritism, and little of the cogwheel attitude.

After all, it is the personal equation in management that is most difficult to control, and that therefore deserves first attention in any study of the subject. Much of what has been written and said of industrial management deals too much with methods and too rarely with the human beings to whom these methods are committed. Many management experts exhibit unlimited faith in means as they have formulated them into system. While

system is the machinery of management, and is absolutely indispensable to the successful directing of most of our modern industrialism, the men who use the system are equally indispensable.

Let us not forget that the primary object of organization is to bring brainy men together for thought and action. A wise manager seeks and encourages men of ambition. He knows that the ambitious man is not necessarily dangerous, and sees his ambition as a spur to effort. He knows that a successful organization requires men of strong individuality, free to contribute their separate powers, but loyally subordinating their individual preferences to the general policy once declared.

In order that its work may be well done and its action strong and forcible, the organization must move forward as a harmonious unit. Herein lies the task and the genius of the leader, the organizer of men as distinguished from the mere systematizer of

*Manager Should
Be Both Leader
and Systematizer*

things. Both are needed, and it is always fortunate when both aptitudes are combined in one man. Such a leader builds or rebuilds his organization, guided by the seven principles, and fitting his whole system to the peculiar requirements of his business and the

limitations that may affect it. In other words, his system of control through the organization of men and methods is shaped to fit his own plant, just as his factory building is.

While his method of management cannot be borrowed in its entirety ready-made, but must be selected for his own needs, tested at every step of the way by the scientific method, there are certain well-defined types of organization that have been developed through years of industrial experience, and which he may adopt or adapt in part or in whole as his judgment may indicate. These types of organization will be considered in the next chapter.

IV

Types of Organization

IN a certain manufacturing city of Pennsylvania there are two industrial plants of about the same size, engaged in the same kind of manufacturing, and apparently enjoying about the same degree of prosperity. For convenience in discussing them, we shall call one the Smith Company and the other the Johnson Company.

The Smith Company is quite an old concern. It started as a small blacksmith shop seventy or eighty years ago. Mr. Smith was the whole force. He did all the odd jobs that a country blacksmith does, and when the Civil War came in the sixties, rendered valuable service to his country by shoeing horses and repairing wagons for the army. After the war, his son came back from the army and joined his father in the shop. The business grew rapidly. In a few years there were five men employed as workers in addition to the father and son. The father devoted his time to general supervision of the

How a One-Man Concern Developed

business, buying materials, getting customers. The son spent his time in the shop, planning the work and supervising the employees. A chart of the organization at this time showed the following simple arrangement:

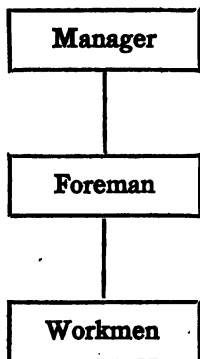


Chart of a Small Industry Illustrating Line Management

In the course of a few years the blacksmith shop developed into a metal-working plant employing more than a hundred men. It was not possible now for one foreman to handle the force, especially since there were several departments into which the plant had been subdivided. It became necessary to increase the management organization by detailing three foremen to have charge of the three departments. The elder Mr. Smith remained the head of the plant, its manager, while his son became superintendent. This organization, you will observe, represents no real

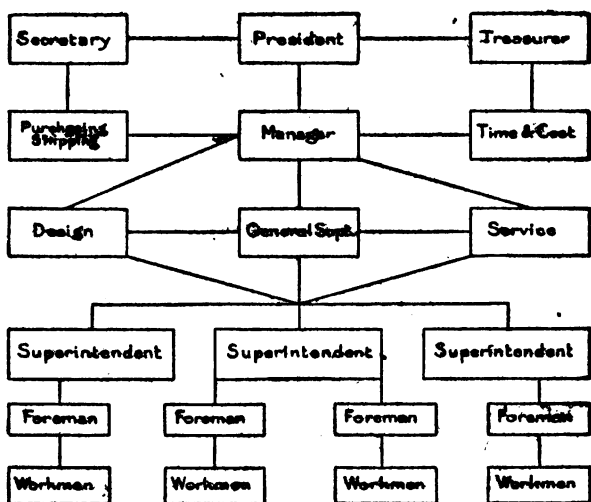
change from the simple organization charted on the preceding page but is simply an extension of it. The lines of authority and responsibility pass in a straight line, from the head of the management to his subordinates.

As the business grew it became advisable to enlarge the plant, and this called for more capital. In order to get new capital, the Smiths decided to incorporate their business. It had been simply a sole proprietorship at first, and later a partnership between father and son. Now they incorporated it as the Smith Company, and by selling shares of stock secured the outside capital which they needed. Since the original incorporation of the Smith Company, the business has continued to increase, new demands for enlarged plant and facilities have caused the company to increase its capital stock from time to time, until now it is a large industrial organization, employing several hundred men, and occupying a prominent place in the industry of its section.

Of course it is no longer possible for Mr. Smith as manager, his son as superintendent, and the three foremen to direct the activities of the business. It is too large an organization, its activities are too numerous and complex for any five men, no matter how skilled

*Expanding
under the
Corporate Form*

and efficient they might be, to manage it successfully. The management has grown and been extended as the business itself has grown, and today the organization of the Smith Company is represented by the chart reproduced below.



A Large Plant of Many Departments Organized According to Line Type of Management

Both the founders are dead now, and a new man is the head of the business. As president he has immediate control of all administrative functions of the corporation, assisted by the company's secretary and treasurer. The

How the Organization Expanded

specialized work of production is intrusted to the manager, an official subordinate only to

the president; and the manager in turn directs through a general superintendent who has under him three departmental superintendents. Under the departmental superintendents are the foremen, and under them of course are the rank and file of the workmen.

Though this chart may seem at first glance to be considerably more complicated than the chart shown on page 44, the two are in fact basically the same. There are, to be sure, various contributory departments, such as that of purchasing and shipping, time and cost, and design, which are not provided for in the smaller chart. These departments represent a development of the staff idea in management, and are created to take off the production executives the details of certain specialized functions, like purchasing, cost accounting, designing, and the like. But the arrangement of control remains the same here as in the simpler chart. The lines of authority and responsibility pass perpendicularly from the president down through manager, general superintendent, departmental superintendents, and foremen. Each executive is responsible to the executive above him for all functions within his department. If anything goes wrong in the finishing department, the manager holds the general superintendent to ac-

count, and the latter goes to his subordinates for a righting of the conditions. The superintendent whose department is at fault has to do his explaining to the general superintendent, and in turn he calls upon his foremen.

Because its control is thus held and exercised in a straight line, this type of organization is generally called "line organization,"

*The Line Type
of Organization* and has come to distinguish a form of management. Nothing can beat

this type of direction in economy and dispatch when the line officials are all fully competent for their duties. Line organization may adopt and apply the scientific method; it can provide for understudies and thus make sure that if an executive drops out for any reason there is some capable person to fill his place. And it cannot be denied that in a line organization the responsibility is definitely placed; each man knows to whom he is responsible and to whom he must look for instructions, orders, and approval.

On the other hand, there are certain disadvantages in line organization. Where the industry is large, it is hard to escape slow transmission of orders and waste of time and effort in repetition of them as they pass down the line. The chief disadvantage, however, is the self-limiting of the scheme due to the natural restrictions of the human being. Good man-

agement through line organization on a big scale calls for exceptional ability.

As a result, departmental control combined with some degree of specializing in supervising functions is the inevitable path of progress in growing industries. The most elaborate specialization amongst industries has been evolved in machine shops where the demand for higher precision of work has led to much research and profitable division of functions in supervising, instructing, and leading the workmen.

In contrast with the type of organization represented in the plant of the Smith Company is that of the Johnson Company. It is a brand new concern, organized the year after the outbreak of the World War to take care of some munitions contracts with foreign governments. In this case there was no tradition to build on, no slowly developing organization to be shaped to meet new conditions. The Johnson Company had to build its plant brand new, from the foundation up, and it had to build its organization in much the same way. It called in an industrial engineer who had had experience with the management problems of several different industries, and under the direction of this expert a plan of organization was drawn up and put

*An Organization
Planned and
Built to Order*

into operation. A chart of this organization is shown on the opposite page.

The organization outlined in this chart is in striking contrast with that illustrated on page 46. The lines of authority do *not* pass down perpendicularly, but crisscross. Instead of placing the workmen of a department under a single foreman, they are under eight foremen, each of whom is a specialist in some particular function. Thus there is one foreman called the route clerk; his function is to draw up a schedule for each job and route the job through the factory. Another foreman is the instruction clerk; he draws up the instruction cards which are sent with each job to guide the workman as to how he shall do the work. A third foreman is the cost clerk, who keeps tabs on costs and reports whenever production costs show variations from standard. Then there is a foreman called the gang boss, who has charge of the preparation of work up to the time the piece is set in the machine. Another one is the speed boss who superintends the actual progress of work in the machine. The repair boss sees that the machines are kept in proper condition. The inspector is responsible for the quality of the work, and both the gang boss and the speed boss must see that each job is finished to the satisfaction of the inspector. The disciplina-

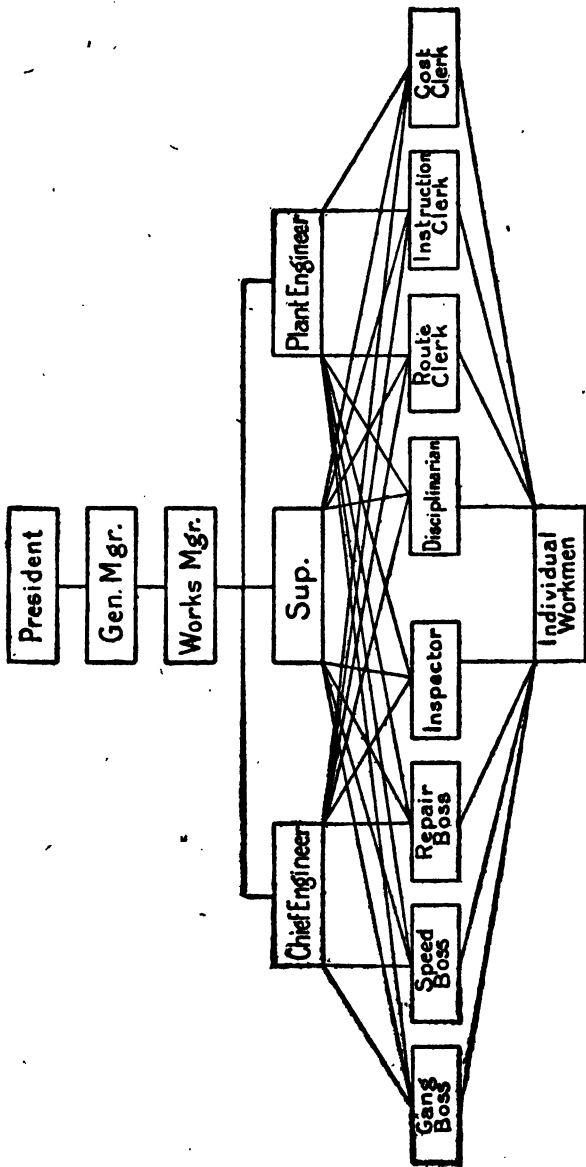


CHART OF AN INDUSTRY EMBODYING FUNCTIONAL MANAGEMENT
Foremanship is specialized and the lines of authority cross as illustrated in the diagram

rian rights differences, should any arise between men in the shop, and sees that personal relations are kept regulated and smooth-running.

This sort of organization is called functionalized foremanship, and in some plants the principle is extended to all departments.

***Functional Type
of Organization***

The chart on page 51 illustrates how the system has been applied in the case of a metal-working industry. The functions vary somewhat from industry to industry. For example, a textile mill would hardly require a division of functions between speed boss and gang boss. A plant that turns out its product by continuous process according to uniform standards, such as a paper mill or a gas plant or a sugar refinery, would hardly require a specialized route clerk. But the principle of splitting up the management according to the functions to be performed, and assigning each function to a specialist who is made responsible for that function and for that alone, is a principle that may be applied to any industry.

Functional organization is associated with scientific management, and by many is identified with the full system of scientific management as developed by Frederick W. Taylor. In fact, by many people functional organization or functional management is called

"the Taylor System." This is a mistake, for as Mr. Taylor pointed out several years ago, functional organization is simply a part of the machinery of his system *The Taylor System* of scientific management, and is by no means the whole system nor even the basic principle of it. The full requirements of the Taylor System are that (1) the exact facts about every element of a man's work be ascertained, thus basing the management on science instead of guesswork, (2) the workmen to do the job be carefully selected with reference to their fitness for it, (3) the workmen so selected be carefully trained in the standardized methods, (4) intimate friendly cooperation be developed between the management and the men. From these principles Mr. Taylor developed his system of management, making use of such elements as time study, functional organization, standardization of tools and of the acts or movements of the workmen, and the idea of the set task accompanied by a bonus for the successful performance of the task. Functional organization may exist without the other elements of the Taylor System, and in fact there are all sorts of variations and combinations of elements of different systems.

Attempts to impose the precise detail of the Taylor System upon varied industries

have not met with uniform success. The theoretical and somewhat arbitrary attitude of scientific management to industry is giving way to respectful attention to the fact that the problems of directing modern production were not solved once for all when a most important and illuminating contribution to machine-shop management had been widely published and appreciated.

Modern industry owes a great debt, nevertheless, to the gifted author of scientific management and his followers in the field of business efficiency. By this propaganda he brought a mental stimulus to production managers and their organizations of every type which has come to stay. It has proved beyond any doubt the value of diverse information provided in readily accessible form and recorded as standard practise, the desirability of using specialists to convey this information and enforce its use, and the lightening of the load of the former general burden-bearer, the foreman.

*Disadvantages
of Functional
Organization* The proved objections in practise to full functional organization have been chiefly that it results in (1) friction due to overlapping authority, (2) slackness in discipline with so many partial "bosses," and (3) an irresponsibility for the final results. As we have already

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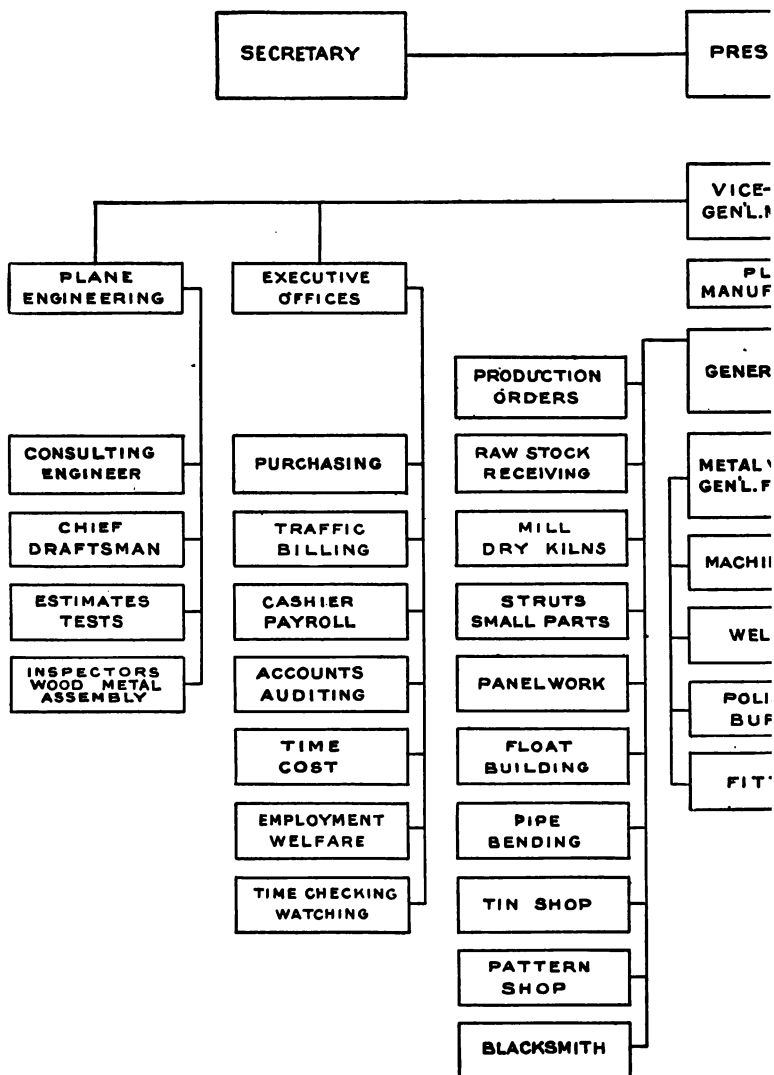
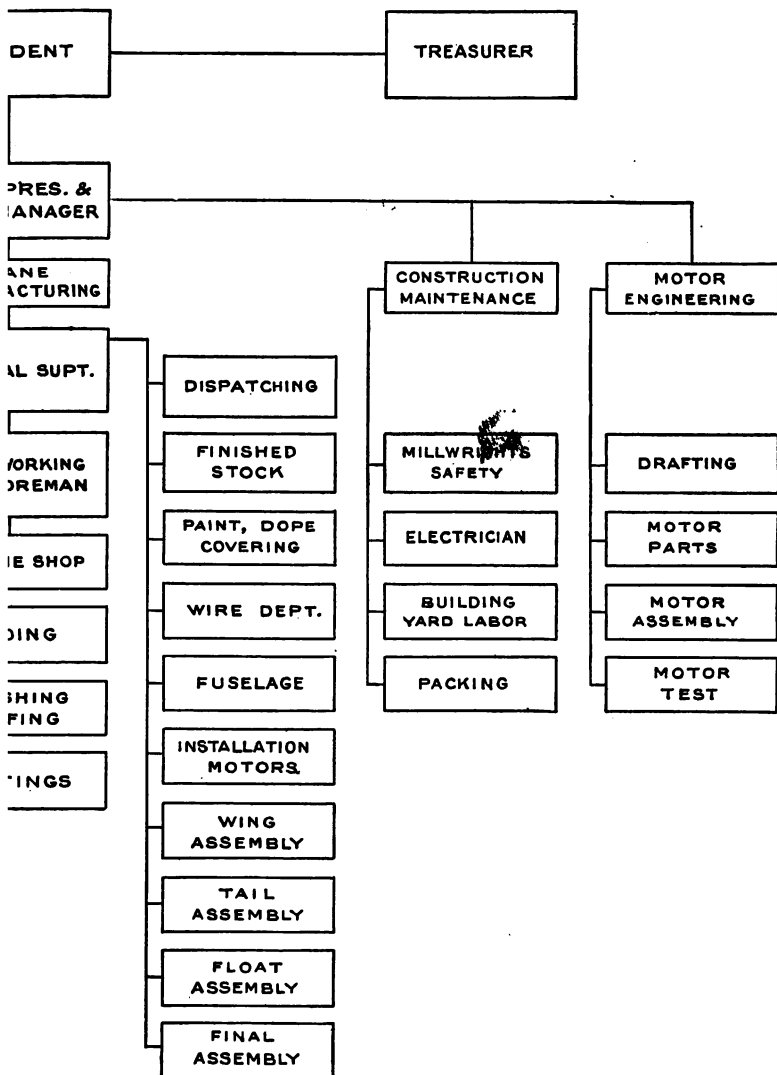
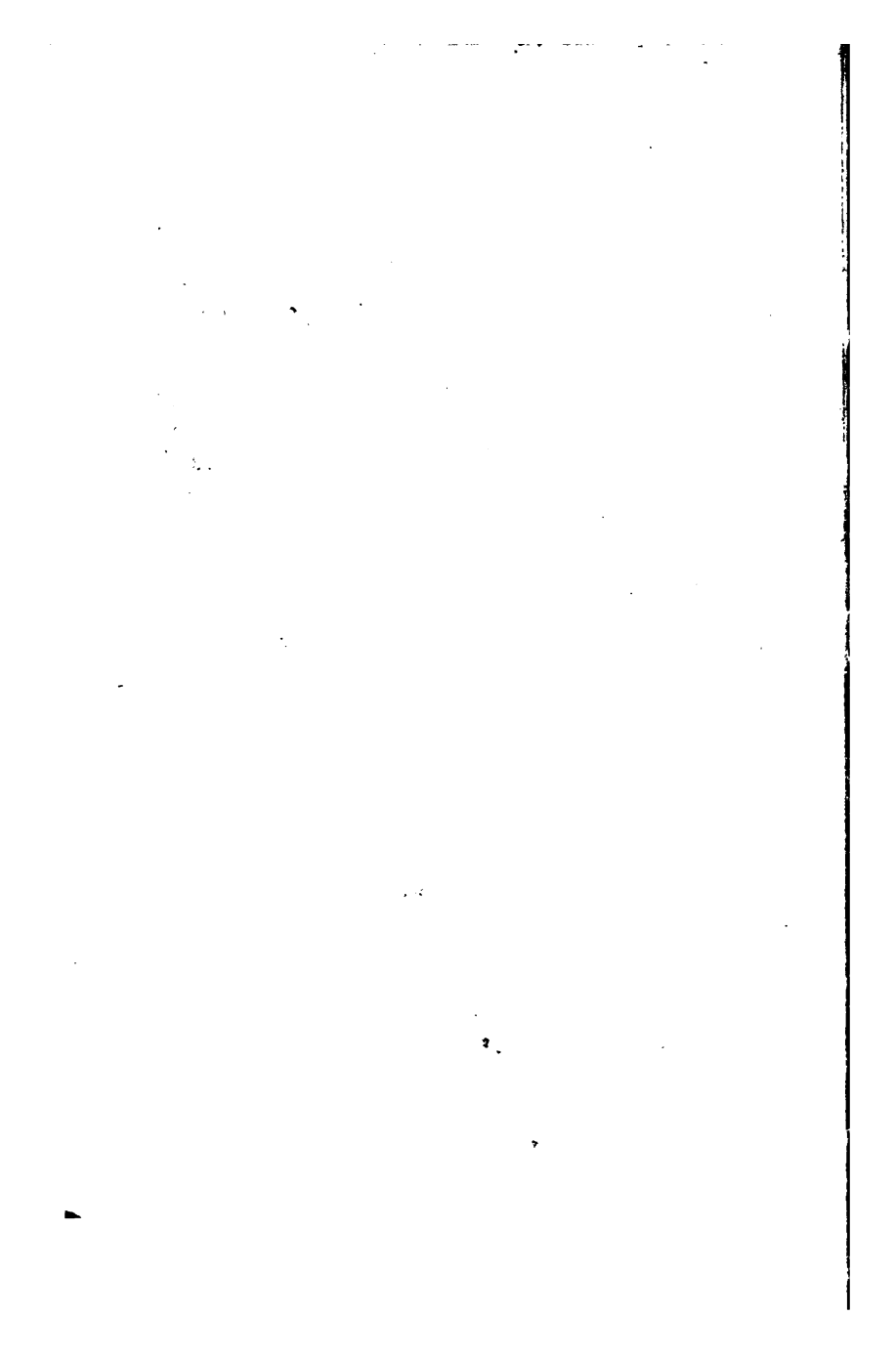


FIG. 2.—ORGANIZATION OF A PLANT ENGAGED IN MAKI



NG SEAPLANES FOR THE UNITED STATES GOVERNMENT



shown, the mainspring of all good modern production is the attitude of *mind* in which its problems are attacked, and not so much the precise detail adopted to carry out the chosen plan of organization and management.

The scientific method, which calls for "the truth, the whole truth and nothing but the truth" about all the policies, materials, processes and people involved in industry, will never fail to produce reactions toward efficiency. Commonsense, however, must be relied upon to see that the means chosen in any instance do not become an end in themselves, but are made to submit at all times to the test of product, profit and harmonious action. The use of any scheme, at any plant, at any time, which applies the resources of science to less definite advantage for the investor than more modern and cheaper methods, is not business—though it may be a very interesting experiment. Good business is the selection of probabilities, and poor business is taking chances on possibilities merely. And industry is *business* first, last and all the time.

A new plant may be organized according to a carefully-thought-out plan; the organization of an old plant may represent the slow growth of half a century or more. Yet it is not safe to label the first "scientific" because

it is modern and brand new, and to call the other "traditional" or "rule-of-thumb" organization because it is the result of years of slow evolution. The latter plant may be in the truest sense scientific in its organization and management. Experience is the best teacher, and certainly it is no reflection on a system that it is the product of long experience. Nor is the fact that a system is "new" sufficient to warrant it as the best. Results—the actual proof of it at work—are the only real test.

The organization of many modern factories today represents a combination of the two types, line and functional. In some plants,

*Combining the
Two Types*

the foreman is left in full charge of the actual processing and supervision of work within his department, but the routing, planning, costing, and inspection are assigned to specialists. In some plants, the function of drawing up standard instructions and of looking after repairs is also specialized, and the foreman concentrates on the actual supervision of work and leadership of his men. Of course, the degree of combination depends on the size and nature of the industry. A small plant would find it expensive to have a repairs foreman; there wouldn't be enough repair jobs to keep him busy. A paper mill would hardly require a separate planning department, but it might

very well require one or more specialized repair foremen.

The great advantage of line organization is that there is no divided authority. The great advantage of functional organization is that each foreman is a specialist, freed from the multiplicity of responsibilities that overburden many a foreman in line organization. The problem of a manager in building his organization is to utilize each of these advantages where possible—to be guided in all his planning and choosing by the needs and limitations of his own plant.

This is why it takes brains and hard thinking to work out a real organization plan—one that will work smoothly and effectively. Anyone can get up a nicely-plotted chart, but that isn't solving the problem. The organization must be built in every instance to fit the plant. It must come as the result of an analysis of the particular plant's requirements, resources, and other conditions. Then, and only then, can it be the efficient instrument of good management.

V

System

ORGANIZATION, as has been shown, is an essential step in management. It is necessary to good management. In order to manage, we analyze the problem into its elements, and then we organize the one best way.

But when a thing has to be done frequently, it would be foolish to spend time analyzing it over and over again and organizing a method of procedure each time.

Standardizing the Method

If the job, for example, is that of threading brass pipe in a machine shop, or cutting leather soles in a shoe factory, or wrapping hams in a packing plant, it would be absurd for the machinist to stop his machine as he finished each pipe and analyze how best to thread the next one, ridiculous for the cutter to slash out one thickness of soles and then spend time considering how he would cut the next one, and equally time-wasteful for the wrapper to consider each ham as presenting a separate problem to be analyzed and organized. What the manage-

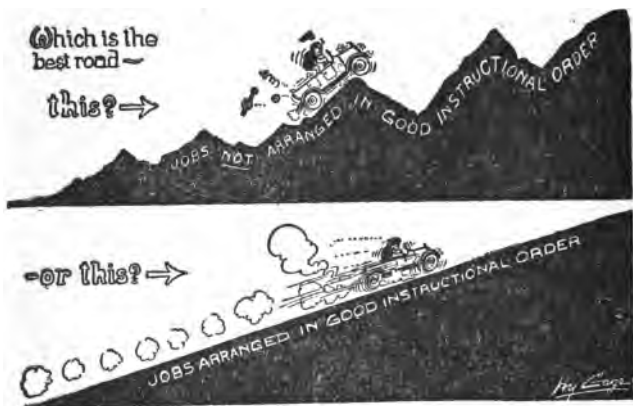
ment does, of course, is to have the job of threading brass piping, of cutting leather soles, and of wrapping hams carefully studied in advance. From this analysis a standard method of doing the job is organized. This standard method is then taught the workmen, and becomes the regular system of handling that particular piece of work.

Without system, industrial efficiency would be impossible. In fact, it may be said as a universal rule of industry that we organize in order to manage, and we manage through system. System is the one best way applied to routine work. A system is simply a standardized way of performing frequently-recurring tasks.

All work may be divided into two classes, (1) exceptional activities, and (2) routine activities. Suppose the growth of a factory's business makes it desirable to double the size of the factory. The problem of planning the additional building and layout and purchasing the necessary equipment is not an activity of routine. It does not come up every week or month, or year even. It is exceptional, and calls for exceptional handling. The general manager, in consultation with other production officials, will give to such a problem as this his very best thought and energy. He

*Two Classes
of Work*

will carefully weigh the various factors entering into the placing, arrangement, and construction of the building, the selection, design, and placing of the machinery, and assisted probably by an architect and an engineer will finally arrive at a decision. Perhaps ten years later a similar problem of enlargement



(From a Report of the Education and Training
Section of the Emergency Fleet Corporation)

Good System Makes the Road Smooth for Production

will come up, and when it does you may be sure that it will have the same careful attention on the part of the management. For this task is exceptional. Though the records of past buildings and equipment are valuable in guiding the management, the problem of expansion is a new one every time it comes up, and must be dealt with accordingly.

But the things that are to be provided year

in and year out—the raw materials and supplies that go into production, the fuel, light, water and other articles—are cared for by the regular purchasing system. It gets bids or quotations from the various sources of supply, sifts them, and selects the best for the purposes required. Though the purchasing of these routine necessities requires supervision, for human judgment is needed wherever choices must be made, it is readily seen that much of the labor here is cared for by the routine operation of the system itself. It would be dangerous and mostly impossible to intrust the exceptional to a system. It would be equally foolish and expensive to employ the “exception method” on routine work.

Most work is routine work. All of us are prone at times to complain of the monotony of our work, and to sigh for something new. As a matter of fact there is probably no position in industry that does not have its percentage of routine, though admittedly some jobs are more repetitious than others. Edison in his laboratory has to perform a certain amount of routine in delving into the mysteries of chemistry and electricity, and similarly the works manager of the biggest industry in the country, in spite of the aid of his various executive assistants, has his own quota of recurring tasks. Without system these tasks

would claim all his time, leaving none for the exceptional tasks to which management must largely devote itself.

*System Is
Formulated
Government* System is really the formulated government of business. It is the result of the second step in management. After you have organized, you have a system. The method of securing applicants, the method of interviewing applicants, the method of training men for the work, the method of purchasing and handling materials, the method of routing jobs, the detailed method of manufacture, the method of inspection, the method of recording costs, the method of paying labor—each of these is a system. System is a boon to every man in the organization, for it is system that prevents misunderstandings, makes teamwork smooth-running, enables a man to specialize and perfect his skill, and gives to management precision, balance, and comprehensive control of all factors in the production process.

Modern production is for system every time, as opposed to the policy of "muddling through somehow," but it has no particular affection for red-tape—mere system for system's sake. In every case, the system adopted should meet the test of practical usefulness. And no system should be accepted simply because it looks symmetrical when charted on

paper, or because it was designed by an expensive expert, or because it is somebody's pet scheme. The whole function of system is to help production to move along smoothly, with less waste of time and money.

There are four rules which will help in devising a new system or in improving an old one. Though apparently simple and commonplace, these rules are all too often ignored or forgotten, as many a plant or departmental executive knows to his great grief. If a system conforms to them, it is almost a certainty that it will prove its value by the practical test of results. The four rules for system are:

*Four Rules
for System*

1. A place for everything, and everything in its place. This means careful layout of equipment and assignment of space.
2. Full provision of all equipment required.
3. Clear instructions as to how the thing is to be done, who are to do it, and who is responsible for results.
4. Avoidance of wasted motion, wasted words, and superfluous equipment, material, supplies, and labor.

These rules will apply in devising any factory system—whether it be a system of delivering material to the workers, or inspect-

ing machines for repairs, or checking up spoilage, or anything else. They can be used by the foreman in a small department as well as by the general manager in planning a comprehensive system for the whole plant.

It is quite possible today to find businesses excellently organized, but poorly managed and inadequately systematized. On the other hand, a business may have some satisfactory departmental systems due to painstaking efforts of enlightened individuals but, through lack of well-defined lines of organization, the net results of operation may be disappointing and the system unsupported.

In other cases, the personal ability of a strong manager makes up for faults in the system, but the limitations of close supervision by one man, however capable, render this an unsafe condition in an industry. It may be accepted as a general rule that proper selection and instruction of the human factors in organization and management will lead sooner or later to a systematic or standardized way of doing things which will be a natural outgrowth of the needs of the business, while mere red-tape will always prove ineffective. Such a state of things should be the object of forethought and deliberate planning.

While making full use of "the exceptional man," a good system helps to secure the con-

tinuity or permanence of a concern's prosperity—though system alone cannot guarantee this.

Always remember that there is no magic about system, no matter whose name may be attached to it. It is no pink pill for pale plants. System is simply organized common sense. If a system is so involved that its elements cannot be easily understood, it is likely to prove a drag rather than a help to efficiency. A description of all of the operating systems in a large organization is bound to be lengthy but it should not be cloudy. Individual systems, whether for clerical or plant functions, may be extremely simple or they may be more or less elaborate, according to the nature of the problems they have to solve; but whether easy or complicated they should always be clear. The desirable system in any case is that which does the work at minimum cost. A system which calls upon you to spend 99 cents in order to save a dollar is a questionable economy.

No system is worth any more than it can earn and it must pay its way. There are systems of doing things in some plants which are most ingenious and interesting and yet undesirable from the point of view of profit-making. There are systems constructed in

the years of plenty which eat off their heads in lean times.

When we come to inquire why it is that many fairly shrewd people fall victims to excessive systematizing, while others do not

*Systems Which Are
Merely Survivals,
Not the Best*

seem to be aware whether or not they have any system, and both lose thereby, we are confronted with the history of attempts at coordinated effort in the business world. The attempt nearly always arises out of trouble with product or profit. The first question which the experienced investigator usually puts, to himself at least, after all the facts are on the table, is not "What system did they have or not have?" but "Is the business worth while anyhow?" This is no idle question. Not a few systematizers have labored valiantly over the plants and made sincere promises of betterment which never came to pass. The reason was that the businesses, irrespective of the system in use, were inherently unprofitable ventures and could have been readily classified as such with a fraction of the energy spent in spinning the web of a new system around them.

Many concerns to which the ardent business doctor would like to apply his remedy would be in the same case as the man about whose noted ill-health a physician remarked, "I

cured him." "But," remonstrated a friend, "the man is dead." "Yes," admitted the physician, "but he died cured."

The systems of many individual businesses are not the result of careful planning. They are found to be haphazard aggregates of schemes evolved over periods of years by many individuals who wished them well and passed on. They have been modified, as time passed, but never coordinated. In many cases common sense has got rid of the most undesirable features. And what remains has at least this justification—it works. In other cases weaknesses have been officially noted and remedied until the systems are established almost beyond question, though nothing definite is known as to their comparative cost and no broad review of the situation has ever been made.

Notwithstanding such conditions, we must frankly recognize the fact that some businesses with such a system history are successful, whether because of their systems or in spite of them we cannot say. This we do know—that many of these relatively simple schemes for getting through the day's work cost very little and are but a small item in the total expense of doing business. Where the system relates, however, to the routine of

an important matter in production or in factory costs, it is by no means negligible, and it is most important that wise and experienced heads should determine "how much" and "how far."

Good system work is derived from three sources. (1) The facts must come from experience; they should never be assumed. (2)

*Three Sources of
Good System* Advantage should be taken of other people's solutions. (3)

Then both must be subjected to careful analysis, if the right judgment is to be arrived at.

We must study each shop problem separately, not forgetting the foreman's place in it. When we have done this, we will realize that in solving any particular problem we will not get very far by mere imitation, for this involves the imposition of outside rules upon conditions for which they were not framed. To this some answer, "Well, change the conditions." But this accommodation of the plant to the proposed system, rather than a moulding of the system to fit the plant requirements, is often neither necessary nor desirable, and is usually a short-sighted policy. Only an adviser of great experience should take the responsibility of suggesting radically-altered conditions in a business where they have become a vital part of its policy, and he

should never be allowed to impose them on his own initiative.

What is the remedy for unwise systematizing?

It is two-fold. First, while holding the chief executive of a business wholly responsible for permitting important changes in system, it is always wise to give his subordinates a chance to offer suggestions. If this is done the proprietors will be surprised at the number of things they assume about their business which are not so. So long as we think correctly we must think of the things as they are. The state of mind within us must correspond to the state of things without us whenever an opportunity arises for comparing them. In other words a passion for facts should override all other considerations, even our most cherished ideas of system detail. Taking the brains of your business into your confidence may seem a very ordinary precaution, but the follies which have been perpetrated for lack of it have done much to injure the legitimate progress of system.

The second aid to correct views in applying system is a sound understanding of what the scientific method essentially is, and of its limited possibilities and relation to the varying factors of business.

In other words, the fullest sort of coopera-

tion on the part of all factors in the management, coupled with a right understanding and faithful use of the scientific method, will insure correct systematizing. The foreman should never allow himself to get into the attitude of thinking that all such matters belong to the realm of the superintendent, the works manager, or the other executives higher up. He is the man nearest to the actual work, and he should be the first to see if a system is failing to make good. Where a fault crops up in an otherwise good system, it is the foreman who is generally on the spot to note that fault and suggest a way of remedying it. Moreover, a wide-awake foreman will constantly run across opportunities to improve methods. It is one of his essential functions, you will remember from Unit I, "to make improvements," and he should never let a chance slip to exercise this function. This does not mean that the foreman is to constitute himself a critic of all existing methods, and go around with blue spectacles on looking for something to change. What is meant is that when a new way of doing the thing suggests itself, he will not carelessly dismiss it as "none of my business," but will instantly make a note of the new idea, think it over carefully, test it if possible, and then when he is fairly certain that

the suggestion has merit, pass it up to the superintendent or manager. It is part of his job to do this, though many foremen seem never to have realized the fact.

When foremen and the higher management cooperate in this way, the scientific method becomes a steady practise and not a theory merely, and system is kept at its highest pitch of efficiency.

VI

System in Routing and Controlling Work

FIRST plan your work, then work your plan," is the keynote of modern production methods. How this is done in general has already been outlined in the unit on "Organization." Now we are to see how the idea is applied in putting work through the plant.

The theory of planning, as used in modern production, is outlined in the following statement of general principles:

The Theory of Planning in Production

1. Increasing the efficiency of operation is a function of the management and not of the workmen. In other words, if the workmen maintain the standard of efficiency that has been set for them, they have rightly performed their function—and it should be the duty of someone else to develop new and more efficient methods.

2. The custody of material in the raw state (as stores), in the partially completed state (as worked materials), and in the finished

product (as stock), is a function of the management, and not of the foremen and workmen. Materials represent money and should be guarded with the same care that safeguards the company's cash.

3. In order to operate a system of management based on these principles it is necessary to have an operating or planning department to which all orders go and from which all detailed instructions issue to the different departments of the works. In order to do this satisfactorily we must have in this planning department the same kind of record for our large plant which the owner of a small shop carries in his head, namely: exact knowledge of (1) the raw material which he has available, (2) the amount of work he has done on any order, (3) the orders to be filled, and (4) the means he has for doing the work as far as both men and machinery are concerned. In other words, this planning department is designed to take the place of the one-man management when the plant has outgrown the ability of one man to know all about it. Without going further into the details of how such a planning department is operated, it may be said that, inasmuch as a man can usually be taught to do well one thing or things of one general class, the usual modern policy is to divide all

work into classes, or functions, and to train experts to perform each function in the best manner that can be devised.

4. The two grand divisions into which these functions may be divided are those relating to the handling of material and those relating to the handling of men. These may be enumerated in general as follows:

HANDLING MATERIAL

- a.* Purchase of materials.
- b.* Custody of materials and stores.
- c.* What shall be done to the material.
- d.* When it shall be done to the material.
- e.* Movement of the material through the works.
- f.* Care of finished product.

HANDLING MEN

- g.* How operations shall be performed on the material.
- h.* What compensation shall be awarded for the work.

5. The efficiency of the employee is conditioned by his physical well-being and contentment in his work. The management therefore is justified in interesting itself in all common-sense steps toward improving workers and working conditions.

It will be readily recognized that the first six of the functions under Principle No. 4 are those which the owner of a small plant could supervise entirely himself. These he

would naturally keep in his own hands, even though he found it necessary on account of the growing amount of business to delegate the last two to assistants. Inasmuch as these six functions are those which are held on to longest by the management in a growing plant, it is natural that, when an organization has been devised in which a planning department (or departments) is represented by a manager with an infinite amount of ability and capacity for work, these functions are the first to be brought into that department.

*Natural Functions
of the Planning
Department*

Moreover, it is impossible to control the method of doing work and the compensation which is paid for its accomplishment until the material and appliances with which the work is to be done are properly controlled. The first problem, therefore, in modern production organization, is to begin the development of a department which will control the first six functions, leaving the last two, the most difficult, for subsequent consideration.

The planning department in its complete development is an organization which takes the place of the one man with a perfect memory and an infinite capacity for work, who has complete knowledge of all the tools in the

*What the
Planning
Department Is*

factory and is familiar with the best methods of doing work with them, who makes it his business to learn about all new methods and appliances as fast as they are developed, or to develop any new methods or appliances that are needed, and to see that they are efficiently utilized in the factory.

The planning department is the source of all orders to the works, and this system of management by the scientific method ultimately gives definite instructions for everything that is to be done. In the ordinary factory system, an order usually consists only of instructions as to what is to be done. In this system an order includes much more. It states:

1. What is to be done.
2. When it is to be done.
3. Where it is to be done.
4. How it is to be done.
5. How long each detail may take.

In introducing such a system we cannot at first say *how work is to be done* or *how long the details may take*, but we can say what is to be done and when each portion of the work is to be completed. We therefore begin by setting a specific time within which the various operations should be completed in order to do the work economically, and so arrange our system of returns that any failure to live

up to these instructions will be at once reported to the manager. The chief executive is thus relieved of the necessity of hunting up delayed work. The system brings each delay automatically to his notice.

Someone must determine how work is to be done, and whoever this is—whatever the name he is called by—he may be considered a part of the planning department. Suppose the product to be made is a *Planning the Work* machine of some kind; it must be designed, drawings must be made, and complete “bills of material” must be written. Probably written specifications must be drawn. All these show *what* to make.

Now it must be determined *how* to make it. This is recorded on operation lists, tool lists, and equipment lists. Some of this information is put in the form of a “route sheet.” If the time *when* to make each part or piece has been settled and recorded on the route sheet, we have a regular time-table for the movement of the work through the factory. This movement is from one work-place to the next according to operation, in the order in which the operations should take place. Each operation should be completed at or before the time calling for completion of such operation on the route sheet. As work is reported completed at one point after an-

other, the fact can be recorded upon the route sheet and thus show on the production office record the exact location and status of any piece of work in the factory.

To start work in the shop, materials, tools, and instructions must be issued to the workmen. To facilitate this work, the modern planning room prepares "stores issues" or requisitions upon the stores room for the material needed. "Tool lists" serve as orders upon the tool room for the tools required, and "work tickets" or "job tickets" show what to do and provide the means of recording the time taken in doing it. If the planning is especially complete, an "instruction card" will be made out for each operation, showing how the work is to be done and giving the time allowed for the whole operation and for each detailed part of it. All of these papers and instructions applying to the production of a given article are collected together in one file under the control of a dispatching clerk or time clerk.

*Facilitating
the Work*

As the stores issues are prepared, they are checked by the balance-of-stores clerk to make sure the needed material is in stores or that purchase requisitions are issued to provide it.

Work may be issued to the shops, either to the workman direct or through the foremen. When one piece of work is completed,

the work ticket is exchanged for a new one authorizing a new job, and with the work ticket go stores issues, tool lists, and instructions for the new job.

The workman may go to the stores room and tool cage and get what the job requires, or the dispatching clerk may issue "move tickets" to have both materials and tools taken to a man's work place a short time before the work should start. The practise varies in different plants. When material has been given out on a stores issue, the ticket is returned to the balance-of-stores clerk to enter on the records.

In planning the work and making up the route sheet, the order in which the work should be done has been determined. In many cases it is possible to vary this order to meet shop emergencies, and it is desirable that this possible variation in routing be recorded. When a given order of operations must be followed without variation, this should be stated on the instruction card unless it is perfectly apparent from the nature of the work. *Routing*

When only one class of product is made, the routing of material from one work plant to another is cared for in laying out the plant. Conveyors may have been provided to carry the work automatically to the right place.

Where some trucking method of transportation is used, fixed routes may be established for the movement of materials. Under such plans as the foregoing, it is not necessary to tag the work with moving instructions, but where the product is such that it cannot follow a fixed routing it should bear a tag showing clearly what it is and where it is to go for the next operation.

Where a trucking system is in use, truckmen tend to wander off the line of their shortest route unless carefully supervised. Definite instructions should be established showing how to go from one work-point to another, what buildings to go through, what elevators to use, and the like. Truckmen should be so supervised that they cannot interfere with other work.

When material is moved only by order through a move ticket, the return of the move ticket to the route clerk supplies information from which he can record on the route sheet the location of the material. In some cases, the routing tag on the material carries coupons which are detached and sent to the route clerk as the material is moved from operation to operation. When the routing is automatic, as by conveyor, other means of keeping track of the progress of the work may be used as described later.

In most production it is convenient to divide the work to be done on any production order into lots. It is much easier to keep track of the work and collect the information as to costs when a lot is of small size. Any work which can pass through one operation in one day or less, may be considered a small lot. Materials, tools, work tickets, are frequently issued against each lot number. Where a variety of work is done in one shop so that one product may require more time and operations than another, a lot system is more accurate in collecting costs than the continuous-flow system, although greater detail is necessary in keeping records. *The Lot System*

When many lots of similar work follow one another through the factory, some means must be adopted for keeping each separate. A good way to do this is to mark the first pieces of a new lot by putting them in a specially-marked container. The last pieces of each lot should likewise be marked distinctively to indicate the completion of the lot. This prevents confusion of one lot with the production ahead and behind it. When a new lot is started, work tickets must be changed, as must also the tool record, or material record if new materials are used. One lot should be completed before a new lot

of the same material is started on any operation; otherwise the work is liable to be mixed and the records become confused.

In each operation a certain amount of material is likely to be spoiled. All of this must be reported so that the total of good material and spoiled material will equal the total of work started. The work in the shop should check at all times with the lot record as corrected for reported spoilage. To insure such accuracy there must be constant watchfulness in the shop. The lot record should be kept by the route clerk so that the route sheet may be checked as each operation on the lot is completed. Thus, the route sheet will show at any time the rate of progress of the lot through the factory and its present standing. Lot reports should be made as a part of the daily shop report, whether or not the entire lot has been completed so far as any operation is concerned.

In some factories, such as paper mills and chemical works, it may not be convenient or desirable to separate the work into lots. Instead, the continuous-flow system

*Continuous-
Flow System*

may be used. The plan may also be adopted in any line of production where the factory may be fully departmentalized, so that only one operation or process takes place in a department.

Under the continuous-flow system all costs of operating a department for a period—such as a day, week, or month—divided by the number of units of material processed, will give the unit cost of the operation. The sum of the unit costs for all operations will give the total cost. All labor and material is charged direct to the department using it. Work tickets need not be changed during the day, and all records are simpler than in the lot system. Daily reports of production from each department show the progress of work through the factory.

Spoiled work is not always a complete loss. Sometimes repairs may be made and the spoiled work reclaimed. When work has been spoiled and may be repaired it is a good plan to separate this from the regular work, crediting the lot with the material thus set aside and charging it against a special repair-lot number. In this way the cost of the repairs may be collected. Work handled in this way must not be returned to the original lot of work or any other lot without making proper records. Carelessness often results in confusing records of the amount of work completed or on hand.

*Spoilage
and
Repairs*

It is unwise to set aside work for repairs and allow it to be forgotten or neglected. The work may not be saleable unless completed

with the original lot. The method of manufacture may change, making it difficult to process the neglected repair lot. By failing to utilize these repair lots promptly, a considerable stock may be collected which it will be difficult to get rid of later without diverting so much labor from regular work as to seriously affect production. It is by far the better practise to keep repairs cleaned up as the need for them occurs in the regular processes.

In many cases, not all work thrown out on inspection is "scrap" or "repair work." In the inspection of large quantities of work of certain kinds, a considerable quantity of good work is thrown out with the bad. It is worth while to reinspect all material rejected on the first inspection, for the recovery of good work thrown out by mistake and to keep a record and check upon the work of the inspectors.

In many classes of work there are certain amounts of unavoidable scrap or waste, not from spoiled work, but resulting from the regular processes. For example, in *Salvage* clothing manufacture a quantity of rags will be left after the suit is cut out; in metal stamping operations, there will be a quantity of blanking scrap left. All such scrap must be carefully collected and sold, as the scrap value may bear an important relation to the total cost of manufacture. In manufactur-

ing brass cartridge shells, the scrap value is larger than the entire labor cost of production.

Spoiled work adds to cost not only because of the good material spoiled, but because of the labor and other expense used upon it. The productive capacity of the factory is decreased in proportion to the amount of spoiled work. A factory can afford to spend considerable money to prevent spoiled work for the sake of the increased output obtained from the plant, independent of the saving from decreased spoilage.

Sometimes a penalty is imposed upon workmen for work spoiled. They may be made to pay for the work spoiled, or for part of it. It is common to allow no pay for doing spoiled work but to pay only *Penalty for Spoilage* for good work. Where it can be arranged to establish standards of good production and keep records of those who excel the standard, a bonus may well be offered for excellent work. The total scrap production of the shops should be watched for signs of trouble and chances to make improvements. A good plan is to maintain a chart for this purpose, showing the percentage of spoiled work due to various causes.

It must be plain to the thoughtful workman that low production costs in the factory are

of benefit to him. Sometimes he may feel that extra efforts on his part to lower costs profit him nothing, while increasing the dividend of his employer. In this respect he is sometimes right for the time being, but in the long run it may be shown that reduced costs benefit the employee. A prosperous manufacturer can maintain better working conditions and supply better tools to work with. This he usually does, as it is to the advantage of the manufacturer to consider the convenience and comfort of his employees. It is also common to find in the more prosperous plants better pay and shorter hours of work. Most important, however, is the fact that due to low costs a manufacturer can better meet competition and keep his factory continuously busy. This in turn insures continuous employment for all employees, and a growth that will give work to ever greater numbers.

When low cost in one factory results in advantage in competition, other factories making similar products are spurred on to make improvements and increase their own efficiency so as to be able to make a lower price and meet the competition. Thus low cost ever tends toward lower price—which means that all can buy more of that product, or such as they need of it, with less money. Efficient production means cheap production

and large consumption. It means a better distribution of the good things of life—a higher standard of living for all.

From this discussion of the theory and general practise of how the team puts work through the factory under the scientific method, we come to a consid-

eration of the control function of management. The immediate purpose of such a control

*Stock and
Production
Control Organized*

is to keep at a minimum the quantity of capital tied up in raw materials and supplies, work-in-process, and finished stock for a given output demand.

The problem of control varies with the character and size of the industry. A factory making only one model of a given product continuously would require much less detail than one turning out many kinds of products; but the fundamental principle of control is the same in all cases. The stock and production control effectively regulates all the expenditures on purchases and on labor, plans what is to be done, assists in bringing it about, and records what was actually accomplished and the why and wherefore of that result.

In the following discussion of stock and production control, the system in use by a metal-working industry which has to assemble its units as well as to process its materials is

being described. The same principles would apply to any industry, though the application is simpler and the detail less elaborate in many.

Stock control and production control are two functions, but are closely related. Stock

Stock Control control should oversee at all times four classes of material, namely:

1. Raw material.
2. Shop consumable supplies.
3. Machine-shop tools.
4. Finished parts stock.

For each of these classes of material it should provide the following:

- a. A systematized location.
- b. A momentary record of quantity (perpetual inventory).
- c. Complete security from loss.
- d. Requisitions for timely additions to stock either by purchases or by new shop orders.

Raw Stock Control Raw stock control in the shops—by which is meant the control of raw materials and supplies (the first and second classes of material in our list)—makes use of a requisition system which should provide for the following as essentials:

- a. A purchasing order for every item (originating requisition).

b. Inspection and count, or weight, of all goods received before any bill is certified for payment.

c. Quickly available information answering these questions:

1. Has the material been ordered, and from whom?
2. What price was last paid for it?
3. Have the goods been received? If so, when?
4. Has the bill been paid? If so, when?
5. How much of this material has been bought within a given period?

Purchasing orders or originating requisitions should be sent to the department or person in charge of stock control in the first instance, and, except for material going into product, should have the general manager's O.K. also. Such requisitions should usually be originated by the following persons or departments, and should be confined to the purposes indicated.

Superintendent, for shop equipment and appliances.

Engineering department, for drafting supplies and for new materials on trial which have not been stocked.

Construction department, for building materials.

Mechanical department, for electrical and mill supplies.

Raw stock department, for all shop sup-

plies and the renewal of stocks of production material.

As stock is finished in any one department, it should pass at once into the keeping of the stock department. This does not mean that

*Control of
Finished Stock*

it is necessarily removed physically to one place containing all the other finished stock. It means that the stock passes to the control of the department responsible for its custody, and that no one may remove or use it except as authorized by the stock department. In many cases, where further operations follow at once, it is found convenient merely to check the flow of finished work from one shop into another, the succeeding foreman becoming immediately responsible for the work delivered to him. In other cases, owing to lack of floor space, the succeeding foreman should not receive the product of another department if he is not prepared to work on it at once. In these cases the stock keeper retains control and provides the place of storage.

The quantity of any part or assembly in process and in finished state is recorded in the stock-control records, where all information as to the location and amount of material, supplies, and stock is at all times available. It cannot be too strongly emphasized that such records should keep account of all stock, in

all stages of production. In many plants at present, the management knows what is finished and what has been ordered, but no reliable figures exist as to what the state of things is between these two stages. It is right there that a large part of the payroll in such plants is tied up. The stock-control perpetual inventory and the data kept by the plant dispatcher furnish the up-to-date records needed.

While stock control provides useful and necessary features of a production-control system, it does not of itself control production operations within the manufacturing departments. Three additional factors are involved in real production control, and these are:

*Production
Control*

1. Routing.
2. Dispatching.
3. Scheduling.

Routing is the standardizing of the order of operations. It determines the lines of greatest speed and least cost for each part, and insures that these lines are followed. It asks:

1. What operations are required?
2. What is the best order for them?
3. What is the best machine or tool to use?
4. What is the best kind of operator to use on it?

Dispatching in a factory is similar in purpose to train dispatching. To start a piece of work at a given time and to be able to predict accurately when it is going to arrive at its destination, the stock room—that is the task of the factory dispatcher. Dispatching, if it is to be worthy of the name, must “deliver the goods.” It is not “chasing,” though often confused with it. Chasing is pursuing by individual attention things that have gone wrong. It will always be needed, for people who make no mistakes never make anything, but chasing should be exceptional. Chasing is chronic in the badly-systematized industry and in poorly-planned production. It wears out the nerves of all involved, and its troubles are fresh every morning.

Dispatching is preceded by observation of shop conditions, time studies of operations, standardization, and routing. Thus the dispatcher knows exactly how long each operation will take, the capacity for work of each department or shop, the flow or amount of work which must be in each shop at any moment for a given output, and how far at any moment a shop is being used up to its full capacity.

The dispatcher must keep the following records:

1. Index of route cards, showing standard routing for each piece.

2. Individual order blanks, filled out for each checking "station" and showing the time of arriving and departing. A large department may need several stations, but in most shops one will suffice.

3. A capacity record for each department, showing how much work is in it, and also how much more might be in it.

4. A "follow up" or tracing system, which keeps the operations from falling behind. By figures or charts, or both combined, the tendency of any part order to lag is noted at once and steps taken to expedite it. Chasing usually follows too late the discovery that it has lagged enough to be missing altogether from stock. Chasing is not dispatching, but a belated attempt to rectify failure.

Scheduling or planning, on which so much stress is rightly laid in modern production, is usually the last thing to be organized and must be preceded by all that has been described here.

When the routing is known to be the best possible for the plant as it is, and the dispatching is in successful operation, it is then possible to schedule or plan just what the production is to be from any department, and to determine just what "flow" of material to put into it. When that is done the management is ready to put all things to the test of actual results, and to run a plant or industry with the smallest possible allowance of "fixed"

capital and of money temporarily tied up in the processing.

All schemes and systems and control plans must ultimately produce adequate product and profit, and be judged solely on that basis.

VII

Management and Morale

SYSTEM is a vain thing unless it is supported by men who respect it, have confidence in it, and are loyal to it. The only way this respect, confidence, and loyalty may be nurtured and brought to fruition is through the personality of the manager, dealing fairly and humanly with his men. It makes no difference whether the manager is the foreman of the smallest department or the chief executive of a million-dollar plant, he will be able to put his system across just in proportion as he appeals to the qualities of heart and mind in the men who work with him.

*The Success of
System Depends
on the
Human Element*

This is why welfare and betterment schemes sometimes fail to get the approval and cooperation of employees. Too often these features appear to them as the grudging gift of an employer far removed, whose only real interest in them—as they see it—is to get as much work and pay as little wages as possible.

Or else they are looked upon as charities, the favors bestowed by some pious employer who gives to earn blessings for himself. Both of these attitudes are wrong, for as Unit III has shown, the educational, recreational, and other betterment features which have become almost universal in modern industry are recognized as direct aids to efficiency. But the men will hardly reason out this conclusion for themselves, unless the management takes the lead, shows its human side, and helps the men to use these morale-building factors in the spirit in which they should be provided.

Morale is a mighty factor in getting results through group effort. It means team spirit, team loyalty, confidence in the cause. It is

*The Meaning
of Morale*

built by confidence in the leadership and by all factors—physical, mental, and moral—which contribute to human well-being. The German cause in the World War collapsed long before the German armies surrendered. It collapsed back in the homes of the German people weeks before the armistice. The beginning of its fall was when the German people began to doubt their cause, began to question the wisdom and perfection of their leadership, and began to realize the moral, as well as the physical, force of America's entry into the war. Their morale began to crumble from that moment,

and the Allied armies in France completed the destruction.

Industry, as well as a nation, has its vital need of morale. Efficient production for any sustained period of time is impossible in a plant where the men are suspicious of the management, jealous of every requirement, always on the lookout for another job, careless of the interests of the plant. A concern whose employees exhibit these symptoms is in a bad way. Unless its morale is built up, sooner or later the business will find itself on the toboggan headed downward—and this, regardless of the excellence of the system it may have developed.

The first of the morale-building factors is the confidence of the men in their leadership. Men attach themselves warmly to men, not to things or systems. Belief in systems very largely rests—especially *Confidence in Leadership* among the lower grades of labor—not so much on the methods authorized for doing the work, as on the men responsible for them. Individually and collectively, in spite of the fullest knowledge of “how” to do a thing and “why” it should be done, men naturally love to be led by a warm-blooded, brainy, and resourceful man, who is clearly more able than the best of them. Industrial plans, as well as military plans, must be *led*

to victory. And for much the same reason—because the morale of the men sustains their effort, makes them put heart and soul into their effort, and fights against inertia, indifference, discontent, and all other enemies of achievement.

Men cannot follow effectively a foreman for whom they have no respect, a superintendent whom they regard as “uppity,” “high and mighty,” “a swell,” or a manager who scarcely nods recognition to a group of his own men when he passes them in the yard and when he does deign to speak addresses them in the tone and manner, if not in the words, of “my good men.” The great leaders of industry have all been of the opposite type.

It is said of Captain Bill Jones, who started in as a monkey-wrench mechanic and became superintendent of the Edgar Thomson Steel

*A Great
Leader
of Men*

Works, that his success as the executive head of that great plant was chiefly due to his faculty of inspiring the confidence and appealing to the loyalty of his men.

Captain Bill was a great master of the processes of steel manufacture, a skilled inventor of steel-making appliances, a notable administrator of industry; but greater than all these was his faculty of winning the cooperation of men. “No detail was too small for Captain Jones’s personal attention,” says James How-

ard Bridge, writing in "The Inside History of the Carnegie Steel Company." "This indeed was one of the secrets of his success with workmen. He was ever on the lookout for their comfort. He personally attended to the ventilation of the shops. To Captain Jones is also due the system of rewards for exceptional service which afterwards characterized the



CAPTAIN BILL JONES



ANDREW CARNEGIE

Two Industrial Managers Who Were Great Leaders of Men

administration of the Carnegie properties, and which has since been extended, with beneficial effects, to all the constituent parts of the United States Steel Corporation."

And yet, Captain Jones was no namby-pamby. You couldn't hoodwink him. His interest in his men, his care for their comfort and welfare, did not mean that the slacker found him "easy" and the grafter found him gullible. He had decision and a will of his own, and was not above using a few choice

cuss words on occasion. Charles M. Schwab, who served his apprenticeship in the steel industry under Captain Jones, has called him "the greatest leader of men the steel business has ever known." And Captain Bill was that because he combined with mechanical genius and a practical knowledge of the business, the personal qualities of a good executive. He was fair, he was tactful, he was democratic and friendly in his relations with other men—in a word, he was human.

Andrew Carnegie, whose success in gaining the cooperation of his workers is a matter of record, was intensely human. He frequently

*An Executive
Who Was Human*

met with his employees in conference, and his geniality, his level common sense, his humor, and his genius for making the men feel that he was one of them, generally smoothed out all difficulties. He knew how to be firm without being domineering. He was wise enough to accompany the orders that he gave with the reasons that actuated them. Mr. Carnegie always claimed that if he had been here at the time the great strike at his Homestead works was threatening, instead of being abroad, that deplorable labor conflict would never have occurred.

An interesting example of how this successful executive handled a labor problem is

given in his Autobiography, published since his death. It illustrates how a firm attitude, provided it is based on reason and fair dealing, can actually strengthen morale as well as secure the direct result aimed for. The problem, in this case, was created by a letter suddenly presented by the workers at the blast furnaces demanding an increase in wages by 4 o'clock Monday afternoon. Refusal meant a walk-out—so the letter said. Mr. Carnegie called together the three committees which governed the works—not only the blast furnace committee involved in the wage demand, but also the mill committee and the converting works committee.

"They sat in a semicircle before me," says Mr. Carnegie, "all with their hats off, of course, as mine was also; and really there was the appearance of a model assembly.

Addressing the chairman of the mill committee, I said: 'Mr. Mackay' *Appealing to Fairness*

(he was an old gentleman and wore spectacles), 'have we an agreement with you covering the remainder of the year?'

"Taking the spectacles off slowly, and holding them in his hand, he said: 'Yes, sir, you have, Mr. Carnegie, and you haven't got enough money to make us break it either.'

"There spoke the true American workman,' I said. 'I am proud of you.—Mr.

Johnson' (who was chairman of the rail converters' committee), 'have we a similar agreement with you?'

"Mr. Johnson was a small spare man. He spoke very deliberately. 'Mr. Carnegie, when an agreement is presented to me to sign, I read it carefully, and if it doesn't suit me, I don't sign it, and if it does suit me I do sign it, and when I sign it I keep it.'

"There again speaks the self-respecting American workman,' I said. Turning now to the chairman of the blast-furnace committee, an Irishman named Kelly, I addressed the same question to him: 'Mr. Kelly, have we an agreement with you covering the remainder of this year?'

"Mr. Kelly answered that he couldn't say, exactly. There was a paper sent round and he signed it, but didn't read it over carefully, and didn't understand just what was

*Mr. Kelly
Confesses to
Carelessness*

in it. At this moment our superintendent, Captain Jones, an excellent manager, but impulsive, exclaimed abruptly: 'Now, Mr. Kelly, you know I read that over twice and discussed it with you!'

"Order, order, Captain! Mr. Kelly is entitled to give his explanation. I sign many a paper that I do not read—documents our lawyers and partners present to me to sign. Mr. Kelly states that he signed this document

under such circumstances and his statement must be received. But, Mr. Kelly, I have always found that the best way is to carry out the provisions of the agreement one signs carelessly and resolve to be more careful next time. Would it not be better for you to continue four months longer under this agreement, and then, when you sign the next one, see that you understand it?’

“There was no answer to this, and I arose and said: ‘Gentlemen of the blast-furnace committee, you have threatened our firm that you will break your agreement and that you will leave these blast furnaces (which means disaster) unless you get a favorable answer to your threat by four o’clock today. It is not yet three, but your answer is ready. You may leave the blast furnaces. The grass will grow green around them before we yield to your threat. The worst day that labor has ever seen in this world is that day in which it dishonors itself by breaking its agreement. You have your answer.’

“The committee filed out slowly and there was silence among the partners. A stranger who was coming in on business met the committee in the passage, and he reported: ‘As I came in, a man wearing spectacles pushed up alongside of an Irishman he called Kelly, and

he said: "You fellows might just as well understand it now as later. There's to be no damned monkeying round these works." "

"That meant business. Later we heard from one of our clerks what took place at the furnaces. Kelly and his committee marched down to them. Of course the men *"Get to Work, Ye Spalpeens"* were waiting and watching for the committee and a crowd had gathered. When the furnaces were reached, Kelly called out to them: 'Get to work, you spalpeens, what are you doing here? Begorra, the little boss just hit from the shoulder. He won't fight, but he says he has sat down, and begorra, we all know he'll be a skeleton before he rises. Go to work, ye spalpeens.' "

And that was the end of the difficulty. "That man Kelly was my stanch friend and admirer ever afterward," says Mr. Carnegie, "and he was before that one of our most violent men."

Firmness, provided it is based on fairness, is an essential quality of good leadership in the upbuilding of morale. It is when the leader becomes a bully, and rules his men by sheer bossing and force of profanity or threat of discharge, that men lose their respect for him. Mutual confidence is then impossible, orders will be ignored just so far as it is safe to ignore them, systems will get only grudging

cooperation, and there will be soldiering whenever the boss's back is turned.

It is not only the personality of the leader that affects morale, but also the working and living conditions that surround the worker.

A man may be thoroughly devoted to his leader, but if his tools or imple- *Conditions
That Affect
Morale* ments are defective, if his working place is insanitary, and his physical health poor, he will be a poor worker just to the extent of these deficiencies. Temporarily good leadership may be able to offset these handicaps to some extent, but if they are allowed to seem permanent, morale will go down and efficiency will be sacrificed.

It is just here that the so-called betterment activities enter in as practical aids to production. Unit III has discussed these features in some detail, and it is not necessary to review them. The wise manager, the wise superintendent, the wise foreman knows that how a man lives does vitally affect the manner of his working. This is why club houses, gymnasiums, athletic fields, lectures and night classes, modern housing facilities, company gardens, libraries, social clubs, and similar features have improved the efficiency of plant after plant in all kinds of industries. It is because they have improved the morale of the workers.

They have introduced new interests in the

lives of the workers, and thus added variety to what might otherwise be a drab existence.

*Humanizing
the Business* They have stimulated group spirit in social and recreational activities, thus strengthening group spirit in actual work. Of course they have provided healthy physical exercise, mental diversion, and wholesome surroundings—all positive benefits in themselves—but most important of all, perhaps, is the sense of community interest that comes to a group of workers through participation in rightly-planned and well-directed betterment activities. They give the employees a feeling that the business is human after all—a sense of membership in a big family—and strengthen their loyalty and stimulate their cooperation.

Whiting Williams, the Cleveland employment manager who put on overalls and went into a strange town as a common laborer and worked as such in various industries, recalls that the finest shower baths he ever met were in a plant under the management of the only man he ever had a desire to murder. In another plant, which recently inaugurated a profit-sharing system, he recalls that the company continues to employ foremen who make the workers pay them for the privilege of getting a job. Betterment work loses most of its value when it is overloaded with poisoners

of morale such as these conditions inevitably bring.

Modern management cannot afford to neglect morale, or to ignore the factors which up-build it. Of course the more elaborate features of betterment work are possible only in large plants, though in some cases several small plants in a community have grouped together for these outside activities, with markedly good results for all. The two main points are (1) that whatever betterment features are provided shall be put forward in the right spirit and with the genuine cooperation and backing of the management, and (2) that every man in the management seek to measure up to the requirements of a true leader by earning the respect, confidence, and loyalty of his men.

VIII

Management and Wages

WHAT has management to do with wages?" asked the foreman of a textile mill in the South. "The price paid for labor is determined by supply and demand, like the price paid for any other commodity."

This remark reminds us of Dr. John R. Commons's classification of three theories of labor, or three ways of looking at labor, which he discusses in his "Industrial Good Will." The first of these is the theory held by the textile foreman, the idea that labor is merely a commodity to be bought, the price varying according as the supply of labor increases or decreases or the demand for labor increases or decreases. A great many industrial managers hold to this theory. Their attitude is that of the purchasing agent; they are out to buy something to use in their manufacturing, and naturally they want the best bargain they can find.

There is truth in the commodity theory of

labor. In time of labor scarcity, wages go up. When labor becomes plentiful and there is unemployment, the wages automatically come down. These facts are undeniably true and employers base their arrangements for labor on them. But they are not the whole truth, and the manager who looks from this viewpoint alone is limiting himself in the tools he may use in his management.

A different attitude is that of the executives who look on labor, not as a commodity, but as a machine. The idea of those holding to this view is, to quote Dr. Commons, "that which is bought and sold is not labor but the product of labor. If the worker is paid by the day or week it is usually because his product cannot be accurately measured. If he is paid by the piece the employer knows exactly what he is buying and how much he is paying for it. Piecework furnishes accurate knowledge of labor costs and estimates of future costs. Furthermore, piecework stimulates the worker to greater exertion and attention. The rough traditional estimate is 25 per cent greater output when paid by the piece than when paid by the day."

*The Machinery
Theory of Labor*

A difficulty with the piecework plan is that as the output per man increases there is a tendency on the part of the employer to cut

the piecerate. This naturally discourages the worker, who then begins to limit his output to avoid further cuts. Thus the purpose of the plan, which is to stimulate production to the greatest possible output per man, is defeated.

A number of engineers, notably those whose names are associated with the scientific management movement, have sought to overcome this defect by devising systems to adjust the pay as output increases so that the benefits of this increased production shall be divided between the employer and the employee. It was argued rightly that piecerates must be cut, sooner or later, as industrial processes improve. All the gain from improvements could not be passed over to the worker, and none go to the employer and consumer, else industry would stagnate. So the various piecework plans, task and bonus systems, and other special methods of giving a direct incentive to the worker were developed, as has already been explained in Chapter VI of Unit II.

The machinery theory of labor is essentially that of the engineering type of mind, as the commodity theory is of the purchasing type. "The commodity theory," says Dr. Commons, "is the merchant's theory of buying and selling. The machinery theory is the engineer's theory of economy and output.

Man is, after all, the most marvelous and productive of the forces of nature. He is a mechanism of unknown possibilities. Treated as a commodity, he is finished and ready for sale. Treated as a machine, he is an operating organism to be economized."

Neither the commodity nor the machinery theory contains the whole truth of labor's relations to industry, however. They are each important, and every successful manager should recognize them and use them. But if his attitude toward the men who work under him goes no farther, he is seriously handicapped. Labor is not only something to be bought. The laborer is not only a productive machine. He is also a customer. He is selling the factory something—his labor, the product of his effort and skill. But the factory also has something to sell the worker, and that is his job. If the manager is interested in getting good honest work, the worker also is interested in getting a good job. To be a successful bargain both sides must be pleased. In other words, there must be good will existing between employer and employee. If good will is absent, work is slovenly done, waste is excessive, costs mount up, and labor turnover is high.

*The Employee
as Customer*

No manager of men, whatever his station, should allow himself to get into the attitude of

thinking that the worker's good will is of no account—that the employer is the only one necessary to be satisfied. Innumerable labor troubles are due to neglect of this point. Many a fight between employer and employee, supposedly caused by a disagreement over wages, has as its real foundation neglect of this principle. Wages are not everything. And even the highest wages will not get the right sort of work unless there is mutual good will.

It is fundamental that the wage system must be fair. The pocketbook is a tender spot, and a touch there is quickly responded to. Shower

*Fairness the
First Essential*

baths, bowling alleys, libraries, concerts, and all such activities will not make up to a worker for an unfair cut in his pay or a wage scale that compares unfavorably with other departments or other plants engaged in the same work. The commodity theory of labor will largely control the prevailing rates of wages. The machinery theory gives the exceptional man a chance to make his extra skill and effort count for himself as well as for the factory. But in all fixing of rates and adjustment of wage scales, the third theory of labor should also be kept in mind. Whatever changes are made should be such as will retain the worker's good will.

This does not mean that wages may never be reduced. Everything that is bought for money, including human service, varies in price. In hard times the doctor and the lawyer have to vary their fees to meet the abilities of people to pay. The income from capital changes with conditions. The main reason why managerial ability commands high salaries is that such ability is almost always scarce. There are more jobs calling for good executives than there are men prepared to fill them. But the compensation of managers is not stationary, and in times of depression may fall off considerably. The law of supply and demand affects all of us, though it must be admitted that the margin of safety is wider for some than for others.

Provided the wage scale is fair, what can the manager do? What can the superintendent do? What can the foreman do? After the wage is set, isn't that all there is to the matter, until conditions change and make a readjustment necessary?

The answer is, No. Frequently a wage scale is fair, but is so complicated that many of the men do not understand it. This is especially true of the involved systems of direct-incentive pay, such as the task-and-bonus system, the differential piece-rate system, and the like. Even

*Making the
Worker See It*

a simple wage plan may be misunderstood by an illiterate laborer. Any departures from what the worker has been accustomed to are always likely to provoke questioning, even when they are to his advantage. All of us are suspicious of change.

To ward off all such doubts and misunderstandings, it should be the practise of the management always to explain in advance any changes in the wage system, to make perfectly clear why the changes are made, what the changes are, how they will affect the worker, what opportunities they offer for increased reward from increased efficiency, and all other points. The same practise should be followed with new workers. Before a man is installed in his new job, the foreman should explain to him just what the system of pay is, at what times payment is made, where, and in what form. Workers have been known to quit a job because they were paid by check, and didn't know how to cash the check. In other cases grumbling and dissatisfaction have been caused by a monthly system of pay, when a weekly or twice-a-month payday would have pleased everybody and reduced labor turnover. Such troubles as this would be discovered early and nipped in the bud, if every foreman made it his duty to keep in touch with what his men are thinking. Modifications

which the plant could make would then be brought promptly to the attention of the management and put into effect, or where changes were impossible to make the foreman would have an opportunity to explain why and thus preserve the good will of the men.

Then, there is such a thing as rubbing a man the right way. This does not mean flattery or coddling. It simply means choosing the method of presentation that will make the strongest appeal to that type of person. An excellent example of *Suiting the Appeal to the Man* suiting the appeal to the man is given by Mr. Frederick W. Taylor in his account of how he increased the efficiency of pig-iron handlers at the Bethlehem Steel Company's works several years ago. The case is an extreme one, and was chosen because of this fact, since it gives emphasis to the point. The reader should be warned in advance that the method adopted by Mr. Taylor could be successfully used only after a careful size-up of the situation which indicated that the man to be appealed to was of a lower type than most American workmen. It may seem at first sight in reading this incident that some of the more human qualities of man-management were lacking; but the best test of a method is its results, and in this case the results were certainly successful.

Under Mr. Taylor's supervision a gang of seventy-five men were employed loading the pig iron from an open field into cars, and it was found that they were loading on the average $12\frac{1}{2}$ tons per man per day. Mr. Taylor made a study of the work and discovered, much to his surprise, that a first-class pig-iron handler ought to load between 47 and 48 tons a day, instead of $12\frac{1}{2}$.

The first step was to find the proper type of man to do this work, and after carefully watching the entire gang four men were picked as physically able. Then a careful study was made of each man separately, and finally one of the four was chosen as the best man for the demonstration. Mr. Taylor wanted to prove that 47 tons was an easily possible amount for a good man to handle, provided he was instructed in the details of the work. This would then establish the standard task at 47 and it would be possible to bring other workers up to that level.

The man chosen, says Mr. Taylor in "The Principles of Scientific Management," was "a little Pennsylvania Dutchman who had been observed to trot back home for a mile or so after his work in the evening about as fresh as he was when he came trotting down to work in the morning. We found that upon wages of \$1.15 a day he had succeeded in buying a

small plot of ground, and that he was engaged in putting up the walls of a little house for himself in the morning before starting to work and at night after leaving. He also had the reputation of being exceedingly 'close,' that is, of placing a very high value on a dollar. This man we will call Schmidt.

"The task before us, then, narrowed itself down to getting Schmidt to handle 47 tons of pig iron per day and making him glad to do it. This was done as follows. Schmidt was called out from among the gang of pig-iron handlers and talked to somewhat in this way:

" 'Schmidt, are you a high-priced man?'

" 'Vell, I don't know vat you mean.'

" 'Oh, yes, you do. What I want to know is whether you are a high-priced man or not.'

" 'Vell, I don't know vat you mean.'

" 'Oh, come now, you answer my questions. What I want to find out is whether you are a high-priced man or one of these cheap fellows. What I want to find out is whether you want to earn \$1.85 a day or whether you are satisfied with \$1.15, just the same as all those cheap fellows are getting.'

" 'Did I vant \$1.85 a day? Vas dot a high-priced man? Vell, yes, I vas a high-priced man.'

" 'Oh, you're aggravating me. Of course

you want \$1.85 a day—everyone wants it! You know perfectly well that that has very little to do with your being a high-priced man. For goodness' sake answer my questions, and don't waste any more of my time. Now come over here. You see that pile of pig iron?

" 'Yes.'

" 'You see that car?'

" 'Yes.'

" 'Well, if you are a high-priced man, you will load that pig-iron on that car tomorrow for \$1.85. Now do wake up and answer my question. Tell me whether you are a high-priced man or not.'

" 'Vell—did I got \$1.85 for loading dot pig iron on dot car tomorrow?'

" 'Yes, of course you do, and you get \$1.85 for loading a pile like that every day right through the year. That is what a high-priced man does, and you know it just as well as I do.'

" 'Vell, dot's all right. I could load dot pig iron on the car tomorrow for \$1.85, and I get it every day, don't I?'

" 'Certainly you do.'

" 'Vell, den, I vas a high-priced man.'

" 'Now, hold on, hold on. You know just as well as I do that a high-priced man has to do exactly as he's told from morning till night.'

You have seen this man here before, haven't you?"

"'No, I never saw him.'

"'Well, if you are a high-priced man, you will do exactly as this man tells you tomorrow, from morning till night. When he tells you to pick up a pig and walk, you pick it up and walk, and when he tells you to sit down and rest, you sit down. You do that straight through the day. And what's more, no back talk. A high-priced man does just what he's told to do, and no back talk. Do you understand that? When this man tells you to walk, you walk; when he tells you to sit down, you sit down, and don't talk back at him. Now you come on to work here tomorrow morning and I'll know before night whether you are a high-priced man.'"

Explaining the Requirements

Mr. Taylor admits that this seems to be rather rough talk, as indeed it would be if applied to an educated mechanic, or even an intelligent laborer. "With a man of the mentally-sluggish type of Schmidt," he explains, "it is appropriate and not unkind, since it is effective in fixing his attention on the high wages which he wants and away from what, if it were called to his attention, he would probably consider impossibly hard work.

"What would Schmidt's answer be if he

were talked to in a manner which is usual under the management of 'initiative and incentive'?—say, as follows: 'Now, Schmidt, you are a first-class pig-iron handler and know your business well. I have given considerable study to handling pig iron, and feel sure that you could do a much larger day's work than you have been doing. Now, don't you think that if you tried you could handle 47 tons of pig iron per day, instead of 12½ tons?' "

*Getting the
Expected Result* Mr. Taylor's conclusion is that the latter form of appeal would not get much cooperation from Schmidt. At all events, the other did, for he went to work in the morning and at half past five that afternoon had loaded 47½ tons.

What's more, Schmidt kept up this pace and never failed to do the task set during the three years Mr. Taylor was with him. Gradually the other men in the gang were put on the "high-priced man" basis, until finally all the pig iron was being handled at the 47½ tons rate, and the men were receiving 60 per cent more wages than they had previously received.

This illustration is an admirable example of putting across a new wage system. In the first place, without violating the law of supply and demand, the machinery theory was applied here. Wages were shifted from a

time basis to an output basis, and the output of the men was increased by careful study of the operations required in performing it and careful supervision to see that the standardized method was followed. The result was higher output for the plant and higher wages for the men—*plus* the increased satisfaction, the good will, of the men on the job. Of course the particular method used would not work with all classes of labor. But it was well adapted to this case, and it succeeded.

Management can use wages to increase the efficiency of its workers—not only by increasing wages, a function that is generally reserved to the higher management, or that is largely determined by labor supply and demand—but by putting the wage appeal in the right light and by using all possible incentives. The wage system is, after all, a part of the general system of the plant, and without personal leadership no system can be wholly successful.

IX

Management and Results

WHO is that queer-looking duck?" asked one of the directors of a fair-sized Eastern manufacturing concern, as he turned from the window in the president's office where he had been waiting. He nodded



"Who is that queer-looking duck?"

in the direction of an undersized, stoop-shouldered man, who was crossing the yard.

"That man?" answered the president, looking out. "Why, Mr. Smith, that is Hundred Percent Joe, one of the best foremen in our plant. Surely you've heard of him!"

"Yes, I've heard of him, and I met him coming down the hall a few minutes ago, but I never knew who he was. Briggs was just telling me only this morning that this Mr. Hundred Percent is the best man for the su-

perintendent's job, now that we're going to put Briggs in the manager's chair. But if that's the fellow, I must say, I can't see it. He a superintendent? Surely we can find a man with more dignity and poise!"

"Dignity and poise!" exclaimed the president. "What do you think we're running here? A dancing academy? Hundred Percent Joe is the biggest man in this organization. Not physically, no; but in results there's not a one can top him. I take my hat off to him every time, for I know he's all there, all wool and a yard wide."

"Oh, he's a good detail man, no doubt," replied Mr. Smith in his precise tone. "I've heard the various reports that came up to the directors from time to time as to the excellence of his department and the minor reforms he has introduced there. But when you come to pick a foreman for promotion to the superintendency, it is my opinion that you must look first for a man who can impress his fellows favorably, one who has an appearance of importance and the power to command. It is my opinion that we are in grave danger of spoiling a good foreman to make a weak superintendent." The director glanced out again. "Just look at him," he added. "You can see he's not born to command. I may

*Judging by
Appearances*

seem whimsical, but my judgment seldom fails me."

"Mr. Smith," answered the president, "I'm afraid then that your judgment is going to lose its good reputation this time. You are judg-

***Judging by
Results***

ing this man wholly by appearances. When one hasn't anything else to go on, it's all right to judge by appearances. And I grant you," he added, tactfully, "that Joe is not a General Pershing when it comes to appearances. He doesn't look like one born to command—you are quite right in that. In fact, I don't know but that Joe would be a pretty good choice for the manager's job if it were not that his looks are against him. I admit that appearance is a factor in leadership, in the shop as well as on the battlefield. And Joe realizes his handicap, and is working hard to overcome it.

"But I don't have to depend on his appearance to size-up Hundred Percent Joe, Mr. Smith. He has worked in the plant here seven years now, and I don't have to depend on his looks to form a correct judgment about him. I go to the results he has accomplished here, the records of what he has done. Whether he was born to command or not, he has certainly proved his ability to lead. There isn't a foreman in this town who stands higher with his men, who can get such whole-

hearted cooperation from his department. And he does it, not by any sort of driver tactics either, but by knowing his job thoroughly and by knowing how to appeal to his men and put things up to them in the right way. His looks belie the real facts, Mr. Smith. You think of him as a little runt, his nose down to petty details, but the men in his shop have quite a different opinion, I can assure you. That's why they call him Hundred Percent."

"I was curious to know how he got his nickname," said Mr. Smith.

"It came about during the war," explained the president, "when we were working under high pressure here to turn out some supplies for the government. I was convinced that we could better our production, but there was no time to make a comprehensive study of our entire organization such as would be necessary to a full scientific reorganization of our methods. The need was great, men were scarce, time was pressing close. So I put it up to the various departments. I asked each foreman to do what he could to improve production in his department—and offered as a reward to split fifty-fifty with each department on whatever savings it effected. We got good results from that offer, but nowhere were the results

How Hundred Percent Joe Got His Name

so remarkable as in Joe's department. He introduced some improved methods and the result was exactly a hundred per cent improvement in production. Wastes were cut out, output was increased, and the total gain in efficiency was one hundred per cent. Of course the men in the department were tickled, for the savings effected under Joe's new methods were divided among them in proportion to their wages. They named him Hundred Percent Joe—and the name has stuck."

"I should say," remarked the precise Mr. Smith, "that the results were proof of how badly the work was being handled. This foreman simply showed what a poor supervisor he had been before."

"Oh, I'll admit that the results were not flattering to the management," replied the president, "but I won't admit that the foremen were to blame. Joe had not been authorized before to install new methods. He had to work according to the plans of the management, but the moment we gave him a free hand he showed what he could do. That's the sort of man I want to promote to places of higher supervision and authority. And I don't give a tinker's tink, Mr. Smith, how he looks, how many inches he measures under six feet, how round his shoulders are, or whether his nose is Roman or Grecian or

pug. Joe Benson has proved his ability to manage by what he has done in his department—and I'm in favor of using that sort of ability in the biggest possible way.

"The reforms that he worked out under the pressure of a government wartime contract were not temporary, or just something for his own little department. His scheme of checking up waste and salvaging spoiled material has *Improvements That Helped the Whole Plant* been adopted for the entire plant, and it saved us just \$50,000 last year. Think of that, Mr. Smith, that's money—real dollars—fifty thousand of them! An idea he used for piling stock in his department has been applied in the shipping room, with a considerable saving in space and labor. A scheme he devised for machine inspection and repairs gave a suggestion to Mr. Briggs that has resulted in our present excellent repairs system for the entire plant. And so with other innovations I might mention. Hundred Percent Joe is responsible for many of them."

"Of course the company must recognize results and properly reward them," admitted Mr. Smith.

"But it isn't only a question of rewarding Joe," answered the president. "The only test I know that really means anything is the test of results. How a man looks, how he talks,

his nationality, his ability to draw up charts and plans, his fertility in suggesting ideas—none of these mean anything unless he makes good in actual results. We are running this factory to get results in production, and the only way to get results is to put result-getters where they can do their best. For our own sakes, therefore, I favor Joe Benson for the superintendency. When his name is presented to the board for action next week, I expect to urge his appointment with all the power I have. And I hope, Mr. Smith, I'll have your warm support in that effort."

Mr. Smith didn't say that he would. He hated to eat his own words of a few moments before. But it was apparent that he was thinking mighty seriously. "I am with you on the principle," he admitted at last. "You are quite right in valuing management by its results."

"If you are with me on the principle, Mr. Smith, I'm willing to count that you'll be with me on the application of it," answered the president, smiling.

The rule that management is judged by its results seems commonplace. Why, of course, the only thing that proves whether a thing is successful or not is the fact that it does succeed—that it gets the results aimed at. But how often is the rule ignored or slighted, or

cast overboard altogether. Many a concern rocks along in a half-successful sort of way, many a department drags and just manages to keep up, with nobody apparently concerned about checking up results in detail. The general manager may remark that something is wrong with the system, but as long as the firm is earning a profit he doesn't feel worried, and lets matters drift. The foreman may realize that his department isn't really efficient—it could turn out more work than it really does—but he is busy with routine, and so long as the superintendent doesn't kick, why should he worry?

This is the attitude in many a plant. There is a sense of deficiency, a feeling that all is not as it should be, but the task of testing results seems too big a one to tackle.

In other plants there is a self-satisfied air. Production is going ahead, goods are being sold, the concern is making money, nobody has any doubts as to its efficiency—or, at least, no doubts that are ever expressed. It usually takes a sudden jar—like some unexpected disturbance in the market or the entrance of a strong and vigorous competitor in the field—to wake up a concern of this kind and set the people in it to analyzing themselves for results.

*Results the
Proof of
Accomplishment*

Analysis—that is the method. Management begins and ends with analysis. It analyzes to find out the one best way of organizing and of operating, and after the organization is created and the operations are progressing, it analyzes the results to test them—to see if they really measure up. The method here, like the method in the beginning, is one of taking things to pieces, of splitting up the whole problem into its parts, and examining in detail.

How can you judge a department or a plant, to determine whether its management is good or bad? It doesn't require the services of an efficiency engineer. A level-headed foreman can put the test to his own department if he is willing to make it face the music. And every sincerely ambitious foreman wants just that—the real facts about his department and his management of it. Otherwise he will have no way of guiding his plans for betterment.

There are ten results that should show up as the fruit of good management. These results should be apparent in any size organization, from the smallest department to the largest plant or group of plants, if the management is based on the scientific method

***Results That
Should Show Up
in the Analysis***

and represents the right adaptation of system to the handling of men, machinery, and mate-

rials. As applied to the testing of a department, the results that analysis should show are as follows:

1. The department manned with good workers, and the men properly assigned each according to his fitness for the job.
2. Good spirit in the department, the foreman respected and looked up to, the workmen ambitious and on their toes, low labor turnover.
3. Good organization of men and methods, harmonious teamwork, adequate control, low accident record.
4. Equipment adequate, in good order, and repairs promptly cared for. Good physical arrangement of equipment, insuring no lost motion.
5. Flow of work steady and smooth, all operations standardized so far as possible, good cooperation with other departments.
6. Good quality of product, low rate of spoilage.
7. Clear, adequate, well-kept records.
8. Economy of production, moderate and declining costs, wastage reduced, checks on idle time.
9. Improvements introduced or suggested from time to time.
10. Orders executed promptly and accurately and work carried on according to schedule.

With this list before him, any man who has a knowledge of the conditions existing can check up his department and rate it according to results. It is not a question whether the management is scientific or traditional; whether it has line organization or functional

organization, whether it possesses a charted system or not. The question is "What are the results?" and this question is put to every element involved in the management. The value of listing the items in detail is that it strips the inquiry clear of all generalities and comes down to specific questions.

It will pay the foreman, the department head whatever his title, to check up his department according to this simple method of analysis. It wouldn't be a bad scheme to figure out right now—strictly for yourself—what rating you could honestly give your own department on each of these ten points. In doing so you will be checking yourself up after a manner, for of course the management of an organization is largely determined by the man at the head of it. But just as the self-analysis provided at the beginning of the Course was a good thing for you personally, so will the analysis of your department or plant on the basis of the actual results it is accomplishing, prove of value to you. It will point out the weak spots, indicate where your management needs strengthening, and suggest possible improvements.

Strengthen your ability to manage, and you put yourself forward in the most promising field of industry. The managerial functions offer the greatest opportunity for advance-

ment, simply because the men who can perform them are rare. Anybody can receive authority, can hand out orders, can manipulate systems. What is wanted by business everywhere is men who can *think* productively, who can *use* authority, who can get orders *executed* on time, who can make systems *work* without excessive expense.

The great need that exists for real managing ability was emphasized by E. A. Baker, head of the Industrial Service of the National City Bank of New York, in an interview in the magazine, *Printer's Ink*. Mr. Baker said:

"What this country needs in an industrial sense, needs at this moment more than anything else, is increased managerial ability. There is more production being lost through lack of efficient management than there is through lack of efficient labor. We require a man to serve a long apprenticeship of study and practical preparation before we allow him to practise law, medicine, or dentistry for the individual. We place our industrial undertakings in the hands of almost anyone—yet on our industrial enterprises depend not alone the individual, but the life and prosperity of the nation.

"We hear complaints of labor. There is no question that increased effort from labor

is highly desirable. But we have to take human nature as we find it. Disinclination to work is one of the basic traits of man. There may be a few who really do like to work, but the great majority would certainly prefer to get along without, or only work when they feel like it, and then only at what they feel like doing. On the other hand, it is equally true that practically all human beings are willing to work earnestly and conscientiously if the proper incentives are presented in an understandable way. It is up to management to recognize the conditions of labor as it actually exists and to arrange the conditions under which labor is to work and live, and the method by which labor is to be paid, in such way as to secure maximum effort. It can be done."

Other authorities have recently pointed out the great need that exists for men with managerial ability.

"I'm looking for the exceptional man," said a great industrial executive recently. "I can't find enough of them to fill all the jobs I have." What he meant by the

*Looking for the
Result-Getter*

"exceptional man" is the man who can take hold of things and get results, the man who can manage. That is the cry of business everywhere—the call for men capable of leadership. There may be

temporary set-backs in industry, but the general tendency is steadily upward and onward; and with growth in industry there will be an increasing demand for industrial leaders.

The men who will do the big things in industry in the next twenty-five years are mostly in the smaller executive jobs and in the ranks today. Who knew, among the hundreds who worked with him in the Connecticut wire mill back in 1880, that the husky young laborer, James Farrell, would be the executive head of America's largest industry twenty-five years later? F. D. Underwood was a brakeman in the Milwaukee yards a few years ago; now he is president of an important railroad system. The president of a great ship-building company was laboring as a riveter in the Brooklyn navy yard twenty-five years ago. History repeats itself. The future managers of American industry are, many of them, laboring in the ranks today. Many of them are just earning their spurs as foremen or sub-foremen, some are already climbing into the superintendent's job.

These men will climb as they apply brains and energy and fair dealing to the problems of industry, adapting modern methods to their own plant or departmental problems. They will climb as they apply brains and en-

ergy and fair dealing to themselves, to the development of themselves in the ten essential traits of a good production executive, as listed in Unit I. They will climb in proportion as they increase their skill in handling men, as they fit more smoothly into the complex organization of their plant, as they master and utilize records in checking up all their activities. They will climb as they more and more reject loose habits of thinking and working, reject guesswork as a guide to anything, and accept and apply throughout the scientific method. They will climb as they test themselves for results—always facing the facts whether the results show up favorably or unfavorably.

The good industrial executive is never a shirker, never a dodger. He knows that mental cowardice is quite as evil a thing as physical cowardice. Business wants men who will face the music, and not try to deceive themselves. That is why this Course starts with a system of self-analysis—because frankness and exact information are of the greatest importance and necessity in successful business. And that is why this closing chapter of the book stresses again the value of self-analysis, and suggests a method of analyzing your own management for its results.

Results count. Results are the measure of

your ability. Modern production methods are simply the tested methods of modern American industry which have everywhere been found successful in getting results.

QUIZ QUESTIONS

I

1. What is the definition of management, as given by Mr. Prentice?
2. In what way is the foreman more than merely the head of his department?
3. What are the three principles of management—the so-called “three eyes” of management?
4. What is meant by the scientific method?

II

5. How was the first step in the scientific method applied by the general foreman in the incident cited at the beginning of this chapter?
6. Name five general functions of management, as specified in this chapter.
7. What is the basic principle of all good management?
8. What is meant by the statement that “the scientific method is not a system”?

III

9. What principle of organization was being violated in the Dix Manufacturing Company, as related in this chapter?

10. Name seven principles of good organization.
11. How do these principles affect human relations within the department or plant?

IV

12. What is meant by the line type of organization?
13. What is meant by the functional type of organization?
14. How do the two types differ? What are the advantages of the line type? of the functional type? What are the disadvantages of the line type? of the functional type?
15. What is the Taylor System? Name its four basic requirements.
16. Are the two types of organization ever combined?

V

17. What is system? How does it aid industrial efficiency?
18. Into what two groupings may all work be classified?
19. Name the four rules for system.
20. Name three sources from which good system work is derived.
21. Explain the twofold remedy for unwise systematizing.

VI

22. Name and explain the four principles which underlie the theory of planning in production.
23. What are the functions of a planning department?

24. What are (a) stores issues? (b) tool lists? (c) work tickets? (d) instruction cards? How do these aid in putting work through the plant?

25. Explain how the lot system is operated.

26. Explain how the continuous-flow system works.

27. Outline a good policy to pursue with respect to spoilage and repairs.

28. What is salvage?

29. What is meant by stock and production control?

30. Name four classes of material that come under stock control.

31. Outline a requisition system for raw-stock control.

32. What three additional factors (besides stock control) are involved in efficient control of production?

33. What records are needed by the factory dispatcher?

VII

34. In what way does system depend on the human element?

35. What is meant by morale? How does it factor in management?

36. Name two main factors that affect the morale of a working force.

VIII

37. What is the commodity theory of labor?

38. What is the machinery theory of labor?

39. Why is it that either of these two theories, taken alone, is inadequate? What third point of view should be taken by the management in considering his labor problems?

40. What is the first essential to a good wage system?

41. How does the law of supply and demand affect wages?

42. Why should the foreman or other executive in charge clearly explain the wage system to his men? How does this help in the management?

43. What is meant by "suing the appeal to the man"?

IX

44. Why is it sometimes misleading to judge by appearances? What is the real test of a worker, of a system, or a management?

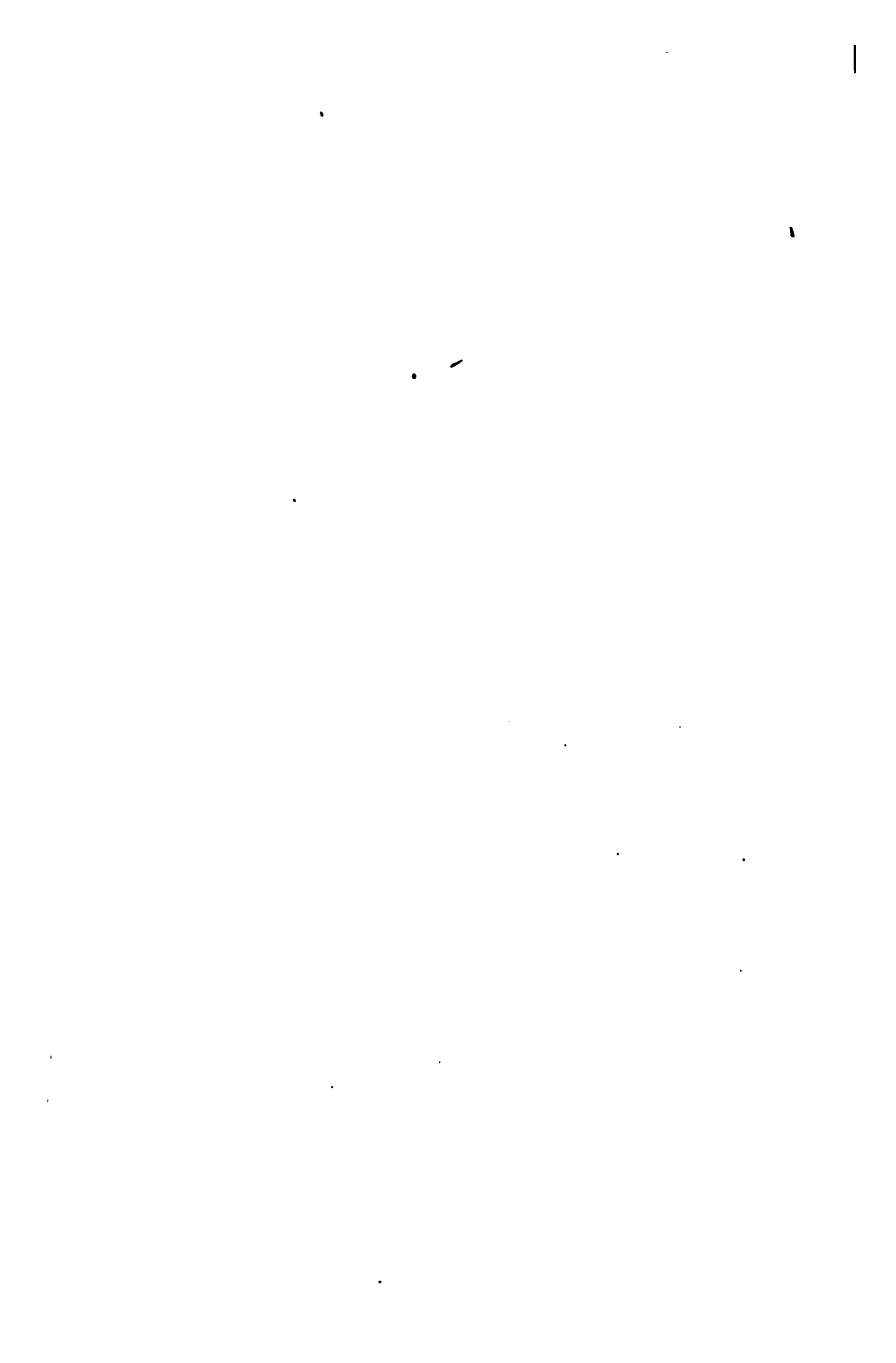
45. Name ten results that should show up in a plant under good management.

46. Explain this statement: "Management begins and ends with analysis."

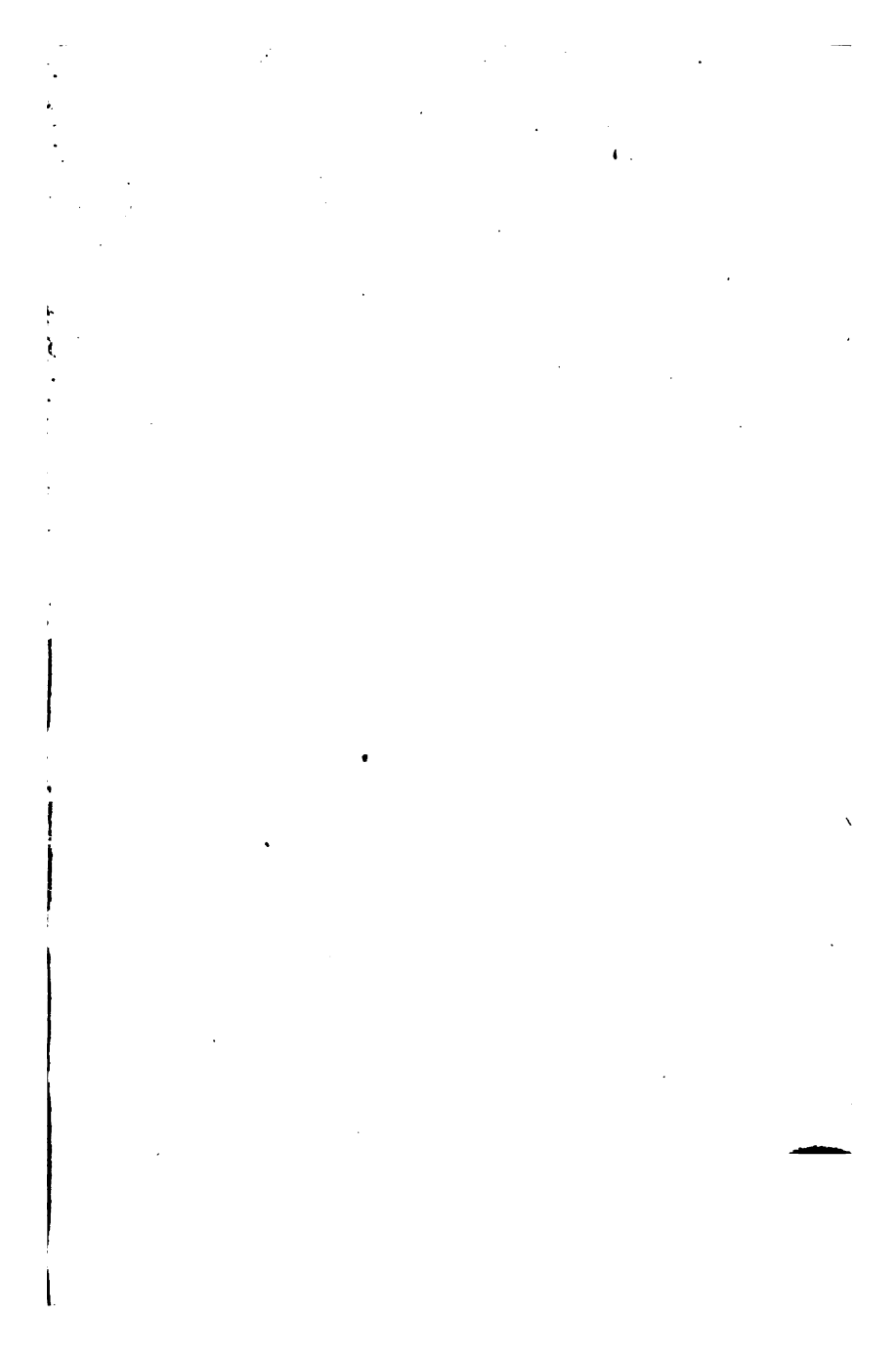
47. Why is it valuable for the foreman or department head to check up the results in his department from time to time?

48. What probable future can the good team leader look forward to?

49. What are modern production methods?



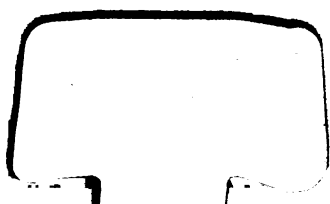
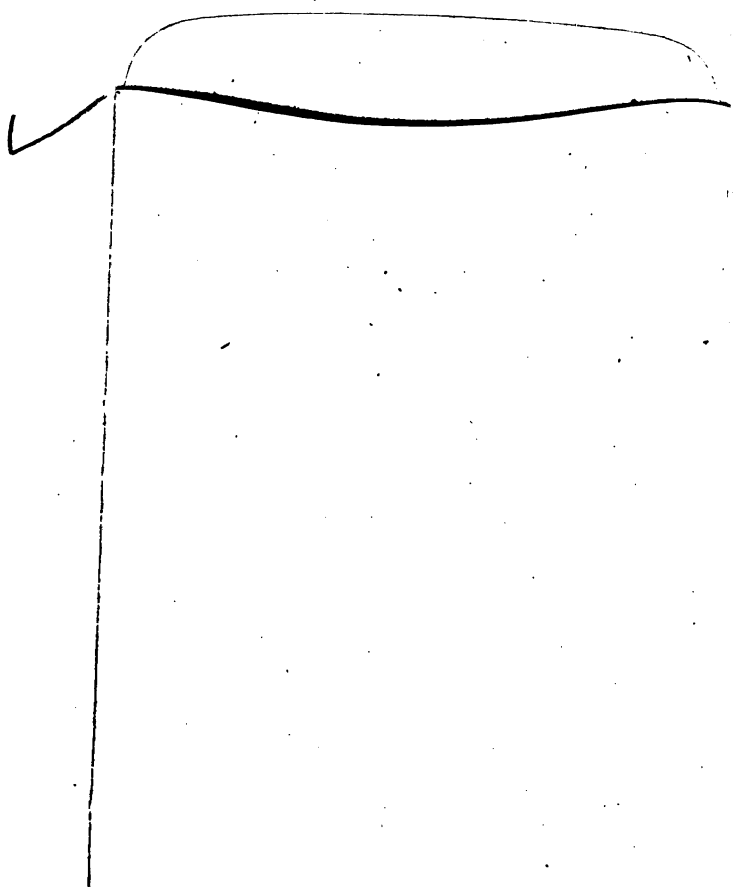




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an important matter in production or in factory costs, it is by no means negligible, and it is most important that wise and experienced heads should determine "how much" and "how far."

Good system work is derived from three sources. (1) The facts must come from experience; they should never be assumed. (2)

*Three Sources of
Good System* Advantage should be taken of other people's solutions. (3)

Then both must be subjected to careful analysis, if the right judgment is to be arrived at.

We must study each shop problem separately, not forgetting the foreman's place in it. When we have done this, we will realize that in solving any particular problem we will not get very far by mere imitation, for this involves the imposition of outside rules upon conditions for which they were not framed. To this some answer, "Well, change the conditions." But this accommodation of the plant to the proposed system, rather than a moulding of the system to fit the plant requirements, is often neither necessary nor desirable, and is usually a short-sighted policy. Only an adviser of great experience should take the responsibility of suggesting radically-altered conditions in a business where they have become a vital part of its policy, and he

should never be allowed to impose them on his own initiative.

What is the remedy for unwise systematizing?

It is two-fold. First, while holding the chief executive of a business wholly responsible for permitting important changes in system, it is always wise to give his subordinates a chance to offer suggestions. If this is done the proprietors will be surprised at the number of things they assume about their business which are not so. So long as we think correctly we must think of the things as they are. The state of mind within us must correspond to the state of things without us whenever an opportunity arises for comparing them. In other words a passion for facts should override all other considerations, even our most cherished ideas of system detail. Taking the brains of your business into your confidence may seem a very ordinary precaution, but the follies which have been perpetrated for lack of it have done much to injure the legitimate progress of system.

The second aid to correct views in applying system is a sound understanding of what the scientific method essentially is, and of its limited possibilities and relation to the varying factors of business.

In other words, the fullest sort of coopera-

tion on the part of all factors in the management, coupled with a right understanding and faithful use of the scientific method, will insure correct systematizing. The foreman should never allow himself to get into the attitude of thinking that all such matters belong to the realm of the superintendent, the works manager, or the other executives higher up. He is the man nearest to the actual work, and he should be the first to see if a system is failing to make good. Where a fault crops up in an otherwise good system, it is the foreman who is generally on the spot to note that fault and suggest a way of remedying it. Moreover, a wide-awake foreman will constantly run across opportunities to improve methods. It is one of his essential functions, you will remember from Unit I, "to make improvements," and he should never let a chance slip to exercise this function. This does not mean that the foreman is to constitute himself a critic of all existing methods, and go around with blue spectacles on looking for something to change. What is meant is that when a new way of doing the thing suggests itself, he will not carelessly dismiss it as "none of my business," but will instantly make a note of the new idea, think it over carefully, test it if possible, and then when he is fairly certain that

the suggestion has merit, pass it up to the superintendent or manager. It is part of his job to do this, though many foremen seem never to have realized the fact.

When foremen and the higher management cooperate in this way, the scientific method becomes a steady practise and not a theory merely, and system is kept at its highest pitch of efficiency.

VI

System in Routing and Controlling Work

FIRST plan your work, then work your plan," is the keynote of modern production methods. How this is done in general has already been outlined in the unit on "Organization." Now we are to see how the idea is applied in putting work through the plant.

The theory of planning, as used in modern production, is outlined in the following statement of general principles:

1. Increasing the efficiency of operation is a function of the management and not of the workmen. In other words, if the workmen maintain the standard of efficiency that has been set for them, they have rightly performed their function—and it should be the duty of someone else to develop new and more efficient methods.

*The Theory of
Planning in
Production*

2. The custody of material in the raw state (as stores), in the partially completed state (as worked materials), and in the finished

product (as stock), is a function of the management, and not of the foremen and workmen. Materials represent money and should be guarded with the same care that safeguards the company's cash.

3. In order to operate a system of management based on these principles it is necessary to have an operating or planning department to which all orders go and from which all detailed instructions issue to the different departments of the works. In order to do this satisfactorily we must have in this planning department the same kind of record for our large plant which the owner of a small shop carries in his head, namely: exact knowledge of (1) the raw material which he has available, (2) the amount of work he has done on any order, (3) the orders to be filled, and (4) the means he has for doing the work as far as both men and machinery are concerned. In other words, this planning department is designed to take the place of the one-man management when the plant has outgrown the ability of one man to know all about it. Without going further into the details of how such a planning department is operated, it may be said that, inasmuch as a man can usually be taught to do well one thing or things of one general class, the usual modern policy is to divide all

work into classes, or functions, and to train experts to perform each function in the best manner that can be devised.

4. The two grand divisions into which these functions may be divided are those relating to the handling of material and those relating to the handling of men. These may be enumerated in general as follows:

HANDLING MATERIAL

- a.* Purchase of materials.
- b.* Custody of materials and stores.
- c.* What shall be done to the material.
- d.* When it shall be done to the material.
- e.* Movement of the material through the works.
- f.* Care of finished product.

HANDLING MEN

- g.* How operations shall be performed on the material.
- h.* What compensation shall be awarded for the work.

5. The efficiency of the employee is conditioned by his physical well-being and contentment in his work. The management therefore is justified in interesting itself in all common-sense steps toward improving workers and working conditions.

It will be readily recognized that the first six of the functions under Principle No. 4 are those which the owner of a small plant could supervise entirely himself. These he

would naturally keep in his own hands, even though he found it necessary on account of the growing amount of business to delegate the last two to assistants. Inasmuch as these six functions are those which are held on to longest by the management in a growing plant, it is natural that, when an organization has been devised in which a planning department (or departments) is represented by a manager with an infinite amount of ability and capacity for work, these functions are the first to be brought into that department.

*Natural Functions
of the Planning
Department*

Moreover, it is impossible to control the method of doing work and the compensation which is paid for its accomplishment until the material and appliances with which the work is to be done are properly controlled. The first problem, therefore, in modern production organization, is to begin the development of a department which will control the first six functions, leaving the last two, the most difficult, for subsequent consideration.

The planning department in its complete development is an organization which takes the place of the one man with a perfect memory and an infinite capacity for work, who has complete knowledge of all the tools in the

*What the
Planning
Department Is*

factory and is familiar with the best methods of doing work with them, who makes it his business to learn about all new methods and appliances as fast as they are developed, or to develop any new methods or appliances that are needed, and to see that they are efficiently utilized in the factory.

The planning department is the source of all orders to the works, and this system of management by the scientific method ultimately gives definite instructions for everything that is to be done. In the ordinary factory system, an order usually consists only of instructions as to what is to be done. In this system an order includes much more. It states:

1. What is to be done.
2. When it is to be done.
3. Where it is to be done.
4. How it is to be done.
5. How long each detail may take.

In introducing such a system we cannot at first say *how work is to be done* or *how long the details may take*, but we can say what is to be done and when each portion of the work is to be completed. We therefore begin by setting a specific time within which the various operations should be completed in order to do the work economically, and so arrange system of returns that any failure to live

up to these instructions will be at once reported to the manager. The chief executive is thus relieved of the necessity of hunting up delayed work. The system brings each delay automatically to his notice.

Someone must determine how work is to be done, and whoever this is—whatever the name he is called by—he may be considered a part of the planning department. Suppose the product to be made is a *Planning the Work* machine of some kind; it must be designed, drawings must be made, and complete “bills of material” must be written. Probably written specifications must be drawn. All these show *what* to make.

Now it must be determined *how* to make it. This is recorded on operation lists, tool lists, and equipment lists. Some of this information is put in the form of a “route sheet.” If the time *when* to make each part or piece has been settled and recorded on the route sheet, we have a regular time-table for the movement of the work through the factory. This movement is from one work-place to the next according to operation, in the order in which the operations should take place. Each operation should be completed at or before the time calling for completion of such operation on the route sheet. As work is reported completed at one point after an-

other, the fact can be recorded upon the route sheet and thus show on the production office record the exact location and status of any piece of work in the factory.

To start work in the shop, materials, tools, and instructions must be issued to the workmen. To facilitate this work, the modern planning room prepares "stores issues" or requisitions upon the stores room for the material needed. "Tool lists" serve as orders upon the tool room for the tools required, and "work tickets" or "job tickets" show what to do and provide the means of recording the time taken in doing it. If the planning is especially complete, an "instruction card" will be made out for each operation, showing how the work is to be done and giving the time allowed for the whole operation and for each detailed part of it. All of these papers and instructions applying to the production of a given article are collected together in one file under the control of a dispatching clerk or time clerk.

As the stores issues are prepared, they are checked by the balance-of-stores clerk to make sure the needed material is in stores or that purchase requisitions are issued to provide it.

Work may be issued to the shops, either to the workman direct or through the foremen. When one piece of work is completed,

the work ticket is exchanged for a new one authorizing a new job, and with the work ticket go stores issues, tool lists, and instructions for the new job.

The workman may go to the stores room and tool cage and get what the job requires, or the dispatching clerk may issue "move tickets" to have both materials and tools taken to a man's work place a short time before the work should start. The practise varies in different plants. When material has been given out on a stores issue, the ticket is returned to the balance-of-stores clerk to enter on the records.

In planning the work and making up the route sheet, the order in which the work should be done has been determined. In many cases it is possible to vary this order to meet shop emergencies, and it is desirable that this possible variation in routing be recorded. When a given order of operations must be followed without variation, this should be stated on the instruction card unless it is perfectly apparent from the nature of the work. *Routing*

When only one class of product is made, the routing of material from one work plant to another is cared for in laying out the plant. Conveyors may have been provided to carry the work automatically to the right place.

Where some trucking method of transportation is used, fixed routes may be established for the movement of materials. Under such plans as the foregoing, it is not necessary to tag the work with moving instructions, but where the product is such that it cannot follow a fixed routing it should bear a tag showing clearly what it is and where it is to go for the next operation.

Where a trucking system is in use, truckmen tend to wander off the line of their shortest route unless carefully supervised. Definite instructions should be established showing how to go from one work-point to another, what buildings to go through, what elevators to use, and the like. Truckmen should be so supervised that they cannot interfere with other work.

When material is moved only by order through a move ticket, the return of the move ticket to the route clerk supplies information from which he can record on the route sheet the location of the material. In some cases, the routing tag on the material carries coupons which are detached and sent to the route clerk as the material is moved from operation to operation. When the routing is automatic, as by conveyor, other means of keeping track of the progress of the work may be used as described later.

In most production it is convenient to divide the work to be done on any production order into lots. It is much easier to keep track of the work and collect the information as to costs when a lot is of small size. Any work which can pass through one operation in one day or less, may be considered a small lot. Materials, tools, work tickets, are frequently issued against each lot number. Where a variety of work is done in one shop so that one product may require more time and operations than another, a lot system is more accurate in collecting costs than the continuous-flow system, although greater detail is necessary in keeping records. *The Lot System*

When many lots of similar work follow one another through the factory, some means must be adopted for keeping each separate. A good way to do this is to mark the first pieces of a new lot by putting them in a specially-marked container. The last pieces of each lot should likewise be marked distinctively to indicate the completion of the lot. This prevents confusion of one lot with the production ahead and behind it. When a new lot is started, work tickets must be changed, as must also the tool record, or material record if new materials are used. One lot should be completed before a new lot

of the same material is started on any operation; otherwise the work is liable to be mixed and the records become confused.

In each operation a certain amount of material is likely to be spoiled. All of this must be reported so that the total of good material and spoiled material will equal the total of work started. The work in the shop should check at all times with the lot record as corrected for reported spoilage. To insure such accuracy there must be constant watchfulness in the shop. The lot record should be kept by the route clerk so that the route sheet may be checked as each operation on the lot is completed. Thus, the route sheet will show at any time the rate of progress of the lot through the factory and its present standing. Lot reports should be made as a part of the daily shop report, whether or not the entire lot has been completed so far as any operation is concerned.

In some factories, such as paper mills and chemical works, it may not be convenient or desirable to separate the work into lots. Instead, the continuous-flow system may be used. The plan may also be adopted in any line of production where the factory may be fully departmentalized, so that only one operation or process takes place in a department.

*Continuous-
Flow System*

Under the continuous-flow system all costs of operating a department for a period—such as a day, week, or month—divided by the number of units of material processed, will give the unit cost of the operation. The sum of the unit costs for all operations will give the total cost. All labor and material is charged direct to the department using it. Work tickets need not be changed during the day, and all records are simpler than in the lot system. Daily reports of production from each department show the progress of work through the factory.

Spoiled work is not always a complete loss. Sometimes repairs may be made and the spoiled work reclaimed. When work has been spoiled and may be repaired it is a good plan to separate this from the regular work, crediting the lot with the material thus set aside and charging it against a special repair-lot number. In this way the cost of the repairs may be collected. Work handled in this way must not be returned to the original lot of work or any other lot without making proper records. Carelessness often results in confusing records of the amount of work completed or on hand.

*Spoilage
and
Repairs*

It is unwise to set aside work for repairs and allow it to be forgotten or neglected. The work may not be saleable unless completed

with the original lot. The method of manufacture may change, making it difficult to process the neglected repair lot. By failing to utilize these repair lots promptly, a considerable stock may be collected which it will be difficult to get rid of later without diverting so much labor from regular work as to seriously affect production. It is by far the better practise to keep repairs cleaned up as the need for them occurs in the regular processes.

In many cases, not all work thrown out on inspection is "scrap" or "repair work." In the inspection of large quantities of work of certain kinds, a considerable quantity of good work is thrown out with the bad. It is worth while to reinspect all material rejected on the first inspection, for the recovery of good work thrown out by mistake and to keep a record and check upon the work of the inspectors.

In many classes of work there are certain amounts of unavoidable scrap or waste, not from spoiled work, but resulting from the regular processes. For example, in *Salvage* clothing manufacture a quantity of rags will be left after the suit is cut out; in metal stamping operations, there will be a quantity of blanking scrap left. All such scrap must be carefully collected and sold, as the scrap value may bear an important relation to the total cost of manufacture. In manufactur-

ing brass cartridge shells, the scrap value is larger than the entire labor cost of production.

Spoiled work adds to cost not only because of the good material spoiled, but because of the labor and other expense used upon it. The productive capacity of the factory is decreased in proportion to the amount of spoiled work. A factory can afford to spend considerable money to prevent spoiled work for the sake of the increased output obtained from the plant, independent of the saving from decreased spoilage.

Sometimes a penalty is imposed upon workmen for work spoiled. They may be made to pay for the work spoiled, or for part of it. It is common to allow no pay for doing spoiled work but to pay only *Penalty for Spoilage* for good work. Where it can be arranged to establish standards of good production and keep records of those who excel the standard, a bonus may well be offered for excellent work. The total scrap production of the shops should be watched for signs of trouble and chances to make improvements. A good plan is to maintain a chart for this purpose, showing the percentage of spoiled work due to various causes.

It must be plain to the thoughtful workman that low production costs in the factory are

of benefit to him. Sometimes he may feel that extra efforts on his part to lower costs profit him nothing, while increasing the dividend of his employer. In this respect he is sometimes right for the time being, but in the long run it may be shown that reduced costs benefit the employee. A prosperous manufacturer can maintain better working conditions and supply better tools to work with. This he usually does, as it is to the advantage of the manufacturer to consider the convenience and comfort of his employees. It is also common to find in the more prosperous plants better pay and shorter hours of work. Most important, however, is the fact that due to low costs a manufacturer can better meet competition and keep his factory continuously busy. This in turn insures continuous employment for all employees, and a growth that will give work to ever greater numbers.

When low cost in one factory results in advantage in competition, other factories making similar products are spurred on to make improvements and increase their own efficiency so as to be able to make a lower price and meet the competition. Thus low cost ever tends toward lower price—which means that all can buy more of that product, or such as they need of it, with less money. Efficient production means cheap production

and large consumption. It means a better distribution of the good things of life—a higher standard of living for all.

From this discussion of the theory and general practise of how the team puts work through the factory under the scientific method, we come to a consid-

eration of the control function of management. The immediate purpose of such a control

*Stock and
Production
Control Organized*

is to keep at a minimum the quantity of capital tied up in raw materials and supplies, work-in-process, and finished stock for a given output demand.

The problem of control varies with the character and size of the industry. A factory making only one model of a given product continuously would require much less detail than one turning out many kinds of products; but the fundamental principle of control is the same in all cases. The stock and production control effectively regulates all the expenditures on purchases and on labor, plans what is to be done, assists in bringing it about, and records what was actually accomplished and the why and wherefore of that result.

In the following discussion of stock and production control, the system in use by a metal-working industry which has to assemble its units as well as to process its materials is

being described. The same principles would apply to any industry, though the application is simpler and the detail less elaborate in many.

Stock control and production control are two functions, but are closely related. Stock control should oversee at all times four classes of material, namely:

1. Raw material.
2. Shop consumable supplies.
3. Machine-shop tools.
4. Finished parts stock.

For each of these classes of material it should provide the following:

- a. A systematized location.
- b. A momentary record of quantity (perpetual inventory).
- c. Complete security from loss.
- d. Requisitions for timely additions to stock either by purchases or by new shop orders.

Raw stock control in the shops—by which is meant the control of raw materials and supplies (the first and second classes of material in our list)—makes use of a requisition system which should provide for the following as essentials:

- a. A purchasing order for every item (originating requisition).

b. Inspection and count, or weight, of all goods received before any bill is certified for payment.

c. Quickly available information answering these questions:

1. Has the material been ordered, and from whom?
2. What price was last paid for it?
3. Have the goods been received? If so, when?
4. Has the bill been paid? If so, when?
5. How much of this material has been bought within a given period?

Purchasing orders or originating requisitions should be sent to the department or person in charge of stock control in the first instance, and, except for material going into product, should have the general manager's O.K. also. Such requisitions should usually be originated by the following persons or departments, and should be confined to the purposes indicated.

Superintendent, for shop equipment and appliances.

Engineering department, for drafting supplies and for new materials on trial which have not been stocked.

Construction department, for building materials.

Mechanical department, for electrical and mill supplies.

Raw stock department, for all shop sup-

plies and the renewal of stocks of production material.

As stock is finished in any one department, it should pass at once into the keeping of the stock department. This does not mean that

*Control of
Finished Stock* it is necessarily removed physically to one place containing all the other finished stock. It means that

the stock passes to the control of the department responsible for its custody, and that no one may remove or use it except as authorized by the stock department. In many cases, where further operations follow at once, it is found convenient merely to check the flow of finished work from one shop into another, the succeeding foreman becoming immediately responsible for the work delivered to him. In other cases, owing to lack of floor space, the succeeding foreman should not receive the product of another department if he is not prepared to work on it at once. In these cases the stock keeper retains control and provides the place of storage.

The quantity of any part or assembly in process and in finished state is recorded in the stock-control records, where all information as to the location and amount of material, supplies, and stock is at all times available. It cannot be too strongly emphasized that such records should keep account of all stock, in

all stages of production. In many plants at present, the management knows what is finished and what has been ordered, but no reliable figures exist as to what the state of things is between these two stages. It is right there that a large part of the payroll in such plants is tied up. The stock-control perpetual inventory and the data kept by the plant dispatcher furnish the up-to-date records needed.

While stock control provides useful and necessary features of a production-control system, it does not of itself control production operations within the manufacturing departments. Three additional factors are involved in real production control, and these are:

*Production
Control*

1. Routing.
2. Dispatching.
3. Scheduling.

Routing is the standardizing of the order of operations. It determines the lines of greatest speed and least cost for each part, and insures that these lines are followed. It asks:

1. What operations are required?
2. What is the best order for them?
3. What is the best machine or tool to use?
4. What is the best kind of operator to use on it?

Dispatching in a factory is similar in purpose to train dispatching. To start a piece of work at a given time and to be able to predict accurately when it is going to arrive at its destination, the stock room—that is the task of the factory dispatcher. Dispatching, if it is to be worthy of the name, must “deliver the goods.” It is not “chasing,” though often confused with it. Chasing is pursuing by individual attention things that have gone wrong. It will always be needed, for people who make no mistakes never make anything, but chasing should be exceptional. Chasing is chronic in the badly-systematized industry and in poorly-planned production. It wears out the nerves of all involved, and its troubles are fresh every morning.

Dispatching is preceded by observation of shop conditions, time studies of operations, standardization, and routing. Thus the dispatcher knows exactly how long each operation will take, the capacity for work of each department or shop, the flow or amount of work which must be in each shop at any moment for a given output, and how far at any moment a shop is being used up to its full capacity.

The dispatcher must keep the following cords:

1. Index of route cards, showing standard routing for each piece.

2. Individual order blanks, filled out for each checking "station" and showing the time of arriving and departing. A large department may need several stations, but in most shops one will suffice.

3. A capacity record for each department, showing how much work is in it, and also how much more might be in it.

4. A "follow up" or tracing system, which keeps the operations from falling behind. By figures or charts, or both combined, the tendency of any part order to lag is noted at once and steps taken to expedite it. Chasing usually follows too late the discovery that it has lagged enough to be missing altogether from stock. Chasing is not dispatching, but a belated attempt to rectify failure.

Scheduling or planning, on which so much stress is rightly laid in modern production, is usually the last thing to be organized and must be preceded by all that has been described here.

When the routing is known to be the best possible for the plant as it is, and the dispatching is in successful operation, it is then possible to schedule or plan just what the production is to be from any department, and to determine just what "flow" of material to put into it. When that is done the management is ready to put all things to the test of actual results, and to run a plant or industry with the smallest possible allowance of "fixed"

Or else they are looked upon as charities, the favors bestowed by some pious employer who gives to earn blessings for himself. Both of these attitudes are wrong, for as Unit III has shown, the educational, recreational, and other betterment features which have become almost universal in modern industry are recognized as direct aids to efficiency. But the men will hardly reason out this conclusion for themselves, unless the management takes the lead, shows its human side, and helps the men to use these morale-building factors in the spirit in which they should be provided.

Morale is a mighty factor in getting results through group effort. It means team spirit, team loyalty, confidence in the cause. It is

*The Meaning
of Morale* built by confidence in the leadership
and by all factors—physical, mental,
and moral—which contribute to

human well-being. The German cause in the World War collapsed long before the German armies surrendered. It collapsed back in the homes of the German people weeks before the armistice. The beginning of its fall was when the German people began to doubt their cause, began to question the wisdom and perfection of their leadership, and began to realize the moral, as well as the physical, force of America's entry into the war. Their morale began to crumble from that moment,

and the Allied armies in France completed the destruction.

Industry, as well as a nation, has its vital need of morale. Efficient production for any sustained period of time is impossible in a plant where the men are suspicious of the management, jealous of every requirement, always on the lookout for another job, careless of the interests of the plant. A concern whose employees exhibit these symptoms is in a bad way. Unless its morale is built up, sooner or later the business will find itself on the toboggan headed downward—and this, regardless of the excellence of the system it may have developed.

The first of the morale-building factors is the confidence of the men in their leadership. Men attach themselves warmly to men, not to things or systems. Belief in systems very largely rests—especially *Confidence in Leadership* among the lower grades of labor—not so much on the methods authorized for doing the work, as on the men responsible for them. Individually and collectively, in spite of the fullest knowledge of “how” to do a thing and “why” it should be done, men naturally love to be led by a warm-blooded, brainy, and resourceful man, who is clearly more able than the best of them. Industrial plans, as well as military plans, must be *led*

to victory. And for much the same reason—because the morale of the men sustains their effort, makes them put heart and soul into their effort, and fights against inertia, indifference, discontent, and all other enemies of achievement.

Men cannot follow effectively a foreman for whom they have no respect, a superintendent whom they regard as “uppity,” “high and mighty,” “a swell,” or a manager who scarcely nods recognition to a group of his own men when he passes them in the yard and when he does deign to speak addresses them in the tone and manner, if not in the words, of “my good men.” The great leaders of industry have all been of the opposite type.

It is said of Captain Bill Jones, who started in as a monkey-wrench mechanic and became superintendent of the Edgar Thomson Steel

*A Great
Leader
of Men*

Works, that his success as the executive head of that great plant was chiefly due to his faculty of inspiring the confidence and appealing to the loyalty of his men.

Captain Bill was a great master of the processes of steel manufacture, a skilled inventor of steel-making appliances, a notable administrator of industry; but greater than all these was his faculty of winning the cooperation of men. “No detail was too small for Captain Jones’s personal attention,” says James How-

ard Bridge, writing in "The Inside History of the Carnegie Steel Company." "This indeed was one of the secrets of his success with workmen. He was ever on the lookout for their comfort. He personally attended to the ventilation of the shops. To Captain Jones is also due the system of rewards for exceptional service which afterwards characterized the



CAPTAIN BILL JONES



ANDREW CARNEGIE

Two Industrial Managers Who Were Great Leaders of Men

administration of the Carnegie properties, and which has since been extended, with beneficial effects, to all the constituent parts of the United States Steel Corporation."

And yet, Captain Jones was no namby-pamby. You couldn't hoodwink him. His interest in his men, his care for their comfort and welfare, did not mean that the slacker found him "easy" and the grafter found him gullible. He had decision and a will of his own, and was not above using a few choice

cuss words on occasion. Charles M. Schwab, who served his apprenticeship in the steel industry under Captain Jones, has called him "the greatest leader of men the steel business has ever known." And Captain Bill was that because he combined with mechanical genius and a practical knowledge of the business, the personal qualities of a good executive. He was fair, he was tactful, he was democratic and friendly in his relations with other men—in a word, he was human.

*An Executive
Who Was Human* Andrew Carnegie, whose success in gaining the cooperation of his workers is a matter of record, was intensely human. He frequently met with his employees in conference, and his geniality, his level common sense, his humor, and his genius for making the men feel that he was one of them, generally smoothed out all difficulties. He knew how to be firm without being domineering. He was wise enough to accompany the orders that he gave with the reasons that actuated them. Mr. Carnegie always claimed that if he had been here at the time the great strike at his Homestead works was threatening, instead of being abroad, that deplorable labor conflict would never have occurred.

An interesting example of how this successful executive handled a labor problem is

given in his Autobiography, published since his death. It illustrates how a firm attitude, provided it is based on reason and fair dealing, can actually strengthen morale as well as secure the direct result aimed for. The problem, in this case, was created by a letter suddenly presented by the workers at the blast furnaces demanding an increase in wages by 4 o'clock Monday afternoon. Refusal meant a walk-out—so the letter said. Mr. Carnegie called together the three committees which governed the works—not only the blast furnace committee involved in the wage demand, but also the mill committee and the converting works committee.

"They sat in a semicircle before me," says Mr. Carnegie, "all with their hats off, of course, as mine was also; and really there was the appearance of a model assembly.

Addressing the chairman of the mill committee, I said: 'Mr. Mackay' *Appealing to Fairness*

(he was an old gentleman and wore spectacles), 'have we an agreement with you covering the remainder of the year?'

"Taking the spectacles off slowly, and holding them in his hand, he said: 'Yes, sir, you have, Mr. Carnegie, and you haven't got enough money to make us break it either.'

"There spoke the true American workman,' I said. 'I am proud of you.—Mr

Johnson' (who was chairman of the rail converters' committee), 'have we a similar agreement with you?'

"Mr. Johnson was a small spare man. He spoke very deliberately. 'Mr. Carnegie, when an agreement is presented to me to sign, I read it carefully, and if it doesn't suit me, I don't sign it, and if it does suit me I do sign it, and when I sign it I keep it.'

" 'There again speaks the self-respecting American workman,' I said. Turning now to the chairman of the blast-furnace committee, an Irishman named Kelly, I addressed the same question to him: 'Mr. Kelly, have we an agreement with you covering the remainder of this year?'

"Mr. Kelly answered that he couldn't say, exactly. There was a paper sent round and he signed it, but didn't read it over carefully, and didn't understand just what was

*Mr. Kelly
Confesses to
Carelessness*

in it. At this moment our superintendent, Captain Jones, an excellent manager, but impulsive, exclaimed abruptly: 'Now, Mr. Kelly, you know I read that over twice and discussed it with you!'

" 'Order, order, Captain! Mr. Kelly is entitled to give his explanation. I sign many a paper that I do not read—documents our lawyers and partners present to me to sign. Mr. Kelly states that he signed this document

under such circumstances and his statement must be received. But, Mr. Kelly, I have always found that the best way is to carry out the provisions of the agreement one signs carelessly and resolve to be more careful next time. Would it not be better for you to continue four months longer under this agreement, and then, when you sign the next one, see that you understand it?

"There was no answer to this, and I arose and said: 'Gentlemen of the blast-furnace committee, you have threatened our firm that you will break your agreement and that you will leave these blast furnaces (which means disaster) unless you get a favorable answer to your threat by four o'clock today. It is not yet three, but your answer is ready. You may leave the blast furnaces. The grass will grow green around them before we yield to your threat. The worst day that labor has ever seen in this world is that day in which it dishonors itself by breaking its agreement. You have your answer.'

"The committee filed out slowly and there was silence among the partners. A stranger who was coming in on business met the committee in the passage, and he reported: 'As I came in, a man wearing spectacles pushed up alongside of an Irishman he called Kelly, and

he said: "You fellows might just as well understand it now as later. There's to be no damned monkeying round these works." "

"That meant business. Later we heard from one of our clerks what took place at the furnaces. Kelly and his committee marched down to them. Of course the men were waiting and watching for the committee and a crowd had gathered. When the furnaces were reached, Kelly called out to them: 'Get to work, you spalpeens, what are you doing here? Begorra, the little boss just hit from the shoulder. He won't fight, but he says he has sat down, and begorra, we all know he'll be a skeleton before he rises. Go to work, ye spalpeens.' "

And that was the end of the difficulty. "That man Kelly was my stanch friend and admirer ever afterward," says Mr. Carnegie, "and he was before that one of our most violent men."

Firmness, provided it is based on fairness, is an essential quality of good leadership in the upbuilding of morale. It is when the leader becomes a bully, and rules his men by sheer bossing and force of profanity or threat of discharge, that men lose their respect for him. Mutual confidence is then impossible, orders will be ignored just so far as it is safe to ignore them, systems will get only grudging

cooperation, and there will be soldiering whenever the boss's back is turned.

It is not only the personality of the leader that affects morale, but also the working and living conditions that surround the worker. A man may be thoroughly devoted to his leader, but if his tools or imple- *Conditions That Affect Morale* ments are defective, if his working place is insanitary, and his physical health poor, he will be a poor worker just to the extent of these deficiencies. Temporarily good leadership may be able to offset these handicaps to some extent, but if they are allowed to seem permanent, morale will go down and efficiency will be sacrificed.

It is just here that the so-called betterment activities enter in as practical aids to production. Unit III has discussed these features in some detail, and it is not necessary to review them. The wise manager, the wise superintendent, the wise foreman knows that how a man lives does vitally affect the manner of his working. This is why club houses, gymnasiums, athletic fields, lectures and night classes, modern housing facilities, company gardens, libraries, social clubs, and similar features have improved the efficiency of plant after plant in all kinds of industries. It is because they have improved the morale of the workers.

They have introduced new interests in the

lives of the workers, and thus added variety to what might otherwise be a drab existence.

*Humanizing
the Business* They have stimulated group spirit in social and recreational activities, thus strengthening group spirit in actual work. Of course they have provided healthy physical exercise, mental diversion, and wholesome surroundings—all positive benefits in themselves—but most important of all, perhaps, is the sense of community interest that comes to a group of workers through participation in rightly-planned and well-directed betterment activities. They give the employees a feeling that the business is human after all—a sense of membership in a big family—and strengthen their loyalty and stimulate their cooperation.

Whiting Williams, the Cleveland employment manager who put on overalls and went into a strange town as a common laborer and worked as such in various industries, recalls that the finest shower baths he ever met were in a plant under the management of the only man he ever had a desire to murder. In another plant, which recently inaugurated a profit-sharing system, he recalls that the company continues to employ foremen who make the workers pay them for the privilege of getting a job. Betterment work loses most of its value when it is overloaded with poisoners

of morale such as these conditions inevitably bring.

Modern management cannot afford to neglect morale, or to ignore the factors which up-build it. Of course the more elaborate features of betterment work are possible only in large plants, though in some cases several small plants in a community have grouped together for these outside activities, with markedly good results for all. The two main points are (1) that whatever betterment features are provided shall be put forward in the right spirit and with the genuine cooperation and backing of the management, and (2) that every man in the management seek to measure up to the requirements of a true leader by earning the respect, confidence, and loyalty of his men.

VIII

Management and Wages

WHAT has management to do with wages?" asked the foreman of a textile mill in the South. "The price paid for labor is determined by supply and demand, like the price paid for any other commodity."

This remark reminds us of Dr. John R. Commons's classification of three theories of labor, or three ways of looking at labor, which he discusses in his "Industrial Good Will." The first of these is the theory held by the textile foreman, the idea that labor is merely a commodity to be bought, the price varying according as the supply of labor increases or decreases or the demand for labor increases or decreases. A great many industrial managers hold to this theory. Their attitude is that of the purchasing agent; they are out to buy something to use in their manufacturing, and naturally they want the best bargain they can find.

There is truth in the commodity theory of

labor. In time of labor scarcity, wages go up. When labor becomes plentiful and there is unemployment, the wages automatically come down. These facts are undeniably true and employers base their arrangements for labor on them. But they are not the whole truth, and the manager who looks from this viewpoint alone is limiting himself in the tools he may use in his management.

A different attitude is that of the executives who look on labor, not as a commodity, but as a machine. The idea of those holding to this view is, to quote Dr. Commons, "that which is bought and sold is not labor but the product of labor. If the worker is paid by the day or week it is usually because his product cannot be accurately measured. If he is paid by the piece the employer knows exactly what he is buying and how much he is paying for it. Piecework furnishes accurate knowledge of labor costs and estimates of future costs. Furthermore, piecework stimulates the worker to greater exertion and attention. The rough traditional estimate is 25 per cent greater output when paid by the piece than when paid by the day."

*The Machinery
Theory of Labor*

A difficulty with the piecework plan is that as the output per man increases there is a tendency on the part of the employer to cut

thinking that the worker's good will is of no account—that the employer is the only one necessary to be satisfied. Innumerable labor troubles are due to neglect of this point. Many a fight between employer and employee, supposedly caused by a disagreement over wages, has as its real foundation neglect of this principle. Wages are not everything. And even the highest wages will not get the right sort of work unless there is mutual good will.

*Fairness the
First Essential* It is fundamental that the wage system must be fair. The pocketbook is a tender spot, and a touch there is quickly responded to. Shower baths, bowling alleys, libraries, concerts, and all such activities will not make up to a worker for an unfair cut in his pay or a wage scale that compares unfavorably with other departments or other plants engaged in the same work. The commodity theory of labor will largely control the prevailing rates of wages. The machinery theory gives the exceptional man a chance to make his extra skill and effort count for himself as well as for the factory. But in all fixing of rates and adjustment of wage scales, the third theory of labor should also be kept in mind. Whatever changes are made should be such as will retain the worker's good will.

This does not mean that wages may never be reduced. Everything that is bought for money, including human service, varies in price. In hard times the doctor and the lawyer have to vary their fees to meet the abilities of people to pay. The income from capital changes with conditions. The main reason why managerial ability commands high salaries is that such ability is almost always scarce. There are more jobs calling for good executives than there are men prepared to fill them. But the compensation of managers is not stationary, and in times of depression may fall off considerably. The law of supply and demand affects all of us, though it must be admitted that the margin of safety is wider for some than for others.

Provided the wage scale is fair, what can the manager do? What can the superintendent do? What can the foreman do? After the wage is set, isn't that all there is to the matter, until conditions change and make a readjustment necessary?

The answer is, No. Frequently a wage scale is fair, but is so complicated that many of the men do not understand it. This is especially true of the involved systems of direct-incentive pay, such as *Making the Worker See It* the task-and-bonus system, the differential piece-rate system, and the like. Even

a simple wage plan may be misunderstood by an illiterate laborer. Any departures from what the worker has been accustomed to are always likely to provoke questioning, even when they are to his advantage. All of us are suspicious of change.

To ward off all such doubts and misunderstandings, it should be the practise of the management always to explain in advance any changes in the wage system, to make perfectly clear why the changes are made, what the changes are, how they will affect the worker, what opportunities they offer for increased reward from increased efficiency, and all other points. The same practise should be followed with new workers. Before a man is installed in his new job, the foreman should explain to him just what the system of pay is, at what times payment is made, where, and in what form. Workers have been known to quit a job because they were paid by check, and didn't know how to cash the check. In other cases grumbling and dissatisfaction have been caused by a monthly system of pay, when a weekly or twice-a-month payday would have pleased everybody and reduced labor turnover. Such troubles as this would be discovered early and nipped in the bud, if every foreman made it his duty to keep in touch with what his men are thinking. Modifications

which the plant could make would then be brought promptly to the attention of the management and put into effect, or where changes were impossible to make the foreman would have an opportunity to explain why and thus preserve the good will of the men.

Then, there is such a thing as rubbing a man the right way. This does not mean flattery or coddling. It simply means choosing the method of presentation that will make the strongest appeal to that type of person. An excellent example of *Suiting the Appeal to the Man* suiting the appeal to the man is given by Mr. Frederick W. Taylor in his account of how he increased the efficiency of pig-iron handlers at the Bethlehem Steel Company's works several years ago. The case is an extreme one, and was chosen because of this fact, since it gives emphasis to the point. The reader should be warned in advance that the method adopted by Mr. Taylor could be successfully used only after a careful size-up of the situation which indicated that the man to be appealed to was of a lower type than most American workmen. It may seem at first sight in reading this incident that some of the more human qualities of man-management were lacking; but the best test of a method is its results, and in this case the results were certainly successful.

Under Mr. Taylor's supervision a gang of seventy-five men were employed loading the pig iron from an open field into cars, and it was found that they were loading on the average $12\frac{1}{2}$ tons per man per day. Mr. Taylor made a study of the work and discovered, much to his surprise, that a first-class pig-iron handler ought to load between 47 and 48 tons a day, instead of $12\frac{1}{2}$.

The first step was to find the proper type of man to do this work, and after carefully watching the entire gang four men were picked as physically able. Then a careful study was made of each man separately, and finally one of the four was chosen as the best man for the demonstration. Mr. Taylor wanted to prove that 47 tons was an easily possible amount for a good man to handle, provided he was instructed in the details of the work. This would then establish the standard task at 47 and it would be possible to bring other workers up to that level.

The man chosen, says Mr. Taylor in "The Principles of Scientific Management," was "a little Pennsylvania Dutchman who had been observed to trot back home for a mile or so after his work in the evening about as fresh as he was when he came trotting down to work in the morning. We found that upon wages of \$1.15 a day he had succeeded in buying a

small plot of ground, and that he was engaged in putting up the walls of a little house for himself in the morning before starting to work and at night after leaving. He also had the reputation of being exceedingly 'close,' that is, of placing a very high value on a dollar. This man we will call Schmidt.

"The task before us, then, narrowed itself down to getting Schmidt to handle 47 tons of pig iron per day and making him glad to do it. This was done as follows. Schmidt was called out from among the gang of pig-iron handlers and talked to somewhat in this way:

" 'Schmidt, are you a high-priced man?'

" 'Vell, I don't know vat you mean.'

" 'Oh, yes, you do. What I want to know is whether you are a high-priced man or not.'

" 'Vell, I don't know vat you mean.'

" 'Oh, come now, you answer my questions. What I want to find out is whether you are a high-priced man or one of these cheap fellows. What I want to find out is whether you want to earn \$1.85 a day or whether you are satisfied with \$1.15, just the same as all those cheap fellows are getting.'

" 'Did I vant \$1.85 a day? Vas dot a high-priced man? Vell, yes, I vas a high-priced man.'

" 'Oh, you're aggravating me. Of course

you want \$1.85 a day—everyone wants it! You know perfectly well that that has very little to do with your being a high-priced man. For goodness' sake answer my questions, and don't waste any more of my time. Now come over here. You see that pile of pig iron?"

"'Yes.'

"'You see that car?"

"'Yes.'

"'Well, if you are a high-priced man, you will load that pig-iron on that car tomorrow for \$1.85. Now do wake up and answer my question. Tell me whether you are a high-priced man or not.'

"'Vell—did I got \$1.85 for loading dot pig iron on dot car tomorrow?"

"'Yes, of course you do, and you get \$1.85 for loading a pile like that every day right through the year. That is what a high-priced man does, and you know it just as well as I do.'

"'Vell, dot's all right. I could load dot pig iron on the car tomorrow for \$1.85, and I get it every day, don't I?"

"'Certainly you do.'

"'Vell, den, I vas a high-priced man.'

"'Now, hold on, hold on. You know just as well as I do that a high-priced man has to do exactly as he's told from morning till night.

You have seen this man here before, haven't you?

"No, I never saw him."

"Well, if you are a high-priced man, you will do exactly as this man tells you tomorrow, from morning till night. When he tells you to pick up a pig and walk, you pick it up and walk, and when he tells you to sit down and rest, you sit down. You do that straight through the day. And what's more, no back talk. A high-priced man does just what he's told to do, and no back talk. Do you understand that? When this man tells you to walk, you walk; when he tells you to sit down, you sit down, and don't talk back at him. Now you come on to work here tomorrow morning and I'll know before night whether you are a high-priced man.'"

Explaining the Requirements

Mr. Taylor admits that this seems to be rather rough talk, as indeed it would be if applied to an educated mechanic, or even an intelligent laborer. "With a man of the mentally-sluggish type of Schmidt," he explains, "it is appropriate and not unkind, since it is effective in fixing his attention on the high wages which he wants and away from what, if it were called to his attention, he would probably consider impossibly hard work.

"What would Schmidt's answer be if he

were talked to in a manner which is usual under the management of 'initiative and incentive'?—say, as follows: 'Now, Schmidt, you are a first-class pig-iron handler and know your business well. I have given considerable study to handling pig iron, and feel sure that you could do a much larger day's work than you have been doing. Now, don't you think that if you tried you could handle 47 tons of pig iron per day, instead of 12½ tons?' "

Mr. Taylor's conclusion is that the latter form of appeal would not get much cooperation from Schmidt. At all events, the other did, for he went to work in the morning and at half past five that afternoon had loaded 47½ tons.

*Getting the
Expected Result*

What's more, Schmidt kept up this pace and never failed to do the task set during the three years Mr. Taylor was with him. Gradually the other men in the gang were put on the "high-priced man" basis, until finally all the pig iron was being handled at the 47½ tons rate, and the men were receiving 60 per cent more wages than they had previously received.

This illustration is an admirable example of putting across a new wage system. In the first place, without violating the law of supply and demand, the machinery theory was applied here. Wages were shifted from a

time basis to an output basis, and the output of the men was increased by careful study of the operations required in performing it and careful supervision to see that the standardized method was followed. The result was higher output for the plant and higher wages for the men—*plus* the increased satisfaction, the good will, of the men on the job. Of course the particular method used would not work with all classes of labor. But it was well adapted to this case, and it succeeded.

Management can use wages to increase the efficiency of its workers—not only by increasing wages, a function that is generally reserved to the higher management, or that is largely determined by labor supply and demand—but by putting the wage appeal in the right light and by using all possible incentives. The wage system is, after all, a part of the general system of the plant, and without personal leadership no system can be wholly successful.

IX

Management and Results

WHO is that queer-looking duck?" asked one of the directors of a fair-sized Eastern manufacturing concern, as he turned from the window in the president's office where he had been waiting. He nodded



"Who is that queer-looking duck?"

in the direction of an undersized, stoop-shouldered man, who was crossing the yard.

"That man?" answered the president, looking out. "Why, Mr. Smith, that is Hundred Percent Joe, one of the best foremen in our plant. Surely you've heard of him!"

"Yes, I've heard of him, and I met him coming down the hall a few minutes ago, but I never knew who he was. Briggs was just telling me only this morning that this Mr. Hundred Percent is the best man for the su-

perintendent's job, now that we're going to put Briggs in the manager's chair. But if that's the fellow, I must say, I can't see it. He a superintendent? Surely we can find a man with more dignity and poise!"

"Dignity and poise!" exclaimed the president. "What do you think we're running here? A dancing academy? Hundred Percent Joe is the biggest man in this organization. Not physically, no; but in results there's not a one can top him. I take my hat off to him every time, for I know he's all there, all wool and a yard wide."

"Oh, he's a good detail man, no doubt," replied Mr. Smith in his precise tone. "I've heard the various reports that came up to the directors from time to time as to the excellence of his department *Judging by Appearances* and the minor reforms he has introduced there. But when you come to pick a foreman for promotion to the superintendency, it is my opinion that you must look first for a man who can impress his fellows favorably, one who has an appearance of importance and the power to command. It is my opinion that we are in grave danger of spoiling a good foreman to make a weak superintendent." The director glanced out again. "Just look at him," he added. "You can see he's not born to command. I may

seem whimsical, but my judgment seldom fails me."

*Judging by
Results*

"Mr. Smith," answered the president, "I'm afraid then that your judgment is going to lose its good reputation this time. You are judging this man wholly by appearances. When one hasn't anything else to go on, it's all right to judge by appearances. And I grant you," he added, tactfully, "that Joe is not a General Pershing when it comes to appearances. He doesn't look like one born to command—you are quite right in that. In fact, I don't know but that Joe would be a pretty good choice for the manager's job if it were not that his looks are against him. I admit that appearance is a factor in leadership, in the shop as well as on the battlefield. And Joe realizes his handicap, and is working hard to overcome it.

"But I don't have to depend on his appearance to size-up Hundred Percent Joe, Mr. Smith. He has worked in the plant here seven years now, and I don't have to depend on his looks to form a correct judgment about him. I go to the results he has accomplished here, the records of what he has done. Whether he was born to command or not, he has certainly proved his ability to lead. There isn't a foreman in this town who stands higher with his men, who can get such whole-

hearted cooperation from his department. And he does it, not by any sort of driver tactics either, but by knowing his job thoroughly and by knowing how to appeal to his men and put things up to them in the right way. His looks belie the real facts, Mr. Smith. You think of him as a little runt, his nose down to petty details, but the men in his shop have quite a different opinion, I can assure you. That's why they call him Hundred Percent."

"I was curious to know how he got his nickname," said Mr. Smith.

"It came about during the war," explained the president, "when we were working under high pressure here to turn out some supplies for the government. I was convinced that we could better our production, but there was no time to make a comprehensive study of our entire organization such as would be necessary to a full scientific reorganization of our methods. The need was great, men were scarce, time was pressing close. So I put it up to the various departments. I asked each foreman to do what he could to improve production in his department—and offered as a reward to split fifty-fifty with each department on whatever savings it effected. We got good results from that offer, but nowhere were the results

*How Hundred
Percent Joe
Got His Name*

so remarkable as in Joe's department. He introduced some improved methods and the result was exactly a hundred per cent improvement in production. Wastes were cut out, output was increased, and the total gain in efficiency was one hundred per cent. Of course the men in the department were tickled, for the savings effected under Joe's new methods were divided among them in proportion to their wages. They named him Hundred Per-cent Joe—and the name has stuck."

"I should say," remarked the precise Mr. Smith, "that the results were proof of how badly the work was being handled. This foreman simply showed what a poor supervisor he had been before."

"Oh, I'll admit that the results were not flattering to the management," replied the president, "but I won't admit that the foremen were to blame. Joe had not been authorized before to install new methods. He had to work according to the plans of the management, but the moment we gave him a free hand he showed what he could do. That's the sort of man I want to promote to places of higher supervision and authority. And I don't give a tinker's tink, Mr. Smith, how he looks, how many inches he measures under six feet, how round his shoulders are, or whether his nose is Roman or Grecian or

pug. Joe Benson has proved his ability to manage by what he has done in his department—and I'm in favor of using that sort of ability in the biggest possible way.

"The reforms that he worked out under the pressure of a government wartime contract were not temporary, or just something for his own little department. His scheme of checking up waste and salvaging spoiled material has *Improvements That Helped the Whole Plant* been adopted for the entire plant, and it saved us just \$50,000 last year. Think of that, Mr. Smith, that's money—real dollars—fifty thousand of them! An idea he used for piling stock in his department has been applied in the shipping room, with a considerable saving in space and labor. A scheme he devised for machine inspection and repairs gave a suggestion to Mr. Briggs that has resulted in our present excellent repairs system for the entire plant. And so with other innovations I might mention. Hundred Percent Joe is responsible for many of them."

"Of course the company must recognize results and properly reward them," admitted Mr. Smith.

"But it isn't only a question of rewarding Joe," answered the president. "The only test I know that really means anything is the test of results. How a man looks, how he talks

his nationality, his ability to draw up charts and plans, his fertility in suggesting ideas—none of these mean anything unless he makes good in actual results. We are running this factory to get results in production, and the only way to get results is to put result-getters where they can do their best. For our own sakes, therefore, I favor Joe Benson for the superintendency. When his name is presented to the board for action next week, I expect to urge his appointment with all the power I have. And I hope, Mr. Smith, I'll have your warm support in that effort."

Mr. Smith didn't say that he would. He hated to eat his own words of a few moments before. But it was apparent that he was thinking mighty seriously. "I am with you on the principle," he admitted at last. "You are quite right in valuing management by its results."

"If you are with me on the principle, Mr. Smith, I'm willing to count that you'll be with me on the application of it," answered the president, smiling.

The rule that management is judged by its results seems commonplace. Why, of course, the only thing that proves whether a thing is successful or not is the fact that it does succeed—that it gets the results aimed at. But how often is the rule ignored or slighted, or

cast overboard altogether. Many a concern rocks along in a half-successful sort of way, many a department drags and just manages to keep up, with *Results the Proof of Accomplishment* nobody apparently concerned about checking up results in detail. The general manager may remark that something is wrong with the system, but as long as the firm is earning a profit he doesn't feel worried, and lets matters drift. The foreman may realize that his department isn't really efficient—it could turn out more work than it really does—but he is busy with routine, and so long as the superintendent doesn't kick, why should he worry?

This is the attitude in many a plant. There is a sense of deficiency, a feeling that all is not as it should be, but the task of testing results seems too big a one to tackle.

In other plants there is a self-satisfied air. Production is going ahead, goods are being sold, the concern is making money, nobody has any doubts as to its efficiency—or, at least, no doubts that are ever expressed. It usually takes a sudden jar—like some unexpected disturbance in the market or the entrance of a strong and vigorous competitor in the field—to wake up a concern of this kind and set the people in it to analyzing themselves for results.

Analysis—that is the method. Management begins and ends with analysis. It analyzes to find out the one best way of organizing and of operating, and after the organization is created and the operations are progressing, it analyzes the results to test them—to see if they really measure up. The method here, like the method in the beginning, is one of taking things to pieces, of splitting up the whole problem into its parts, and examining in detail.

How can you judge a department or a plant, to determine whether its management is good or bad? It doesn't require the services of an efficiency engineer. A level-headed foreman can put the test to his own department if he is willing to make it face the music. And every sincerely ambitious foreman wants just that—the real facts about his department and his management of it. Otherwise he will have no way of guiding his plans for betterment.

There are ten results that should show up as the fruit of good management. These results should be apparent in any size organization,

***Results That
Should Show Up
in the Analysis***

from the smallest department to the largest plant or group of plants, if the management is based on the scientific method and represents the right adaptation of system to the handling of men, machinery, and mate-

rials. As applied to the testing of a department, the results that analysis should show are as follows:

1. The department manned with good workers, and the men properly assigned each according to his fitness for the job.
2. Good spirit in the department, the foreman respected and looked up to, the workmen ambitious and on their toes, low labor turnover.
3. Good organization of men and methods, harmonious teamwork, adequate control, low accident record.
4. Equipment adequate, in good order, and repairs promptly cared for. Good physical arrangement of equipment, insuring no lost motion.
5. Flow of work steady and smooth, all operations standardized so far as possible, good cooperation with other departments.
6. Good quality of product, low rate of spoilage.
7. Clear, adequate, well-kept records.
8. Economy of production, moderate and declining costs, wastage reduced, checks on idle time.
9. Improvements introduced or suggested from time to time.
10. Orders executed promptly and accurately and work carried on according to schedule.

With this list before him, any man who has a knowledge of the conditions existing can check up his department and rate it according to results. It is not a question whether the management is scientific or traditional; whether it has line organization or functional

organization, whether it possesses a charted system or not. The question is "What are the results?" and this question is put to every element involved in the management. The value of listing the items in detail is that it strips the inquiry clear of all generalities and comes down to specific questions.

It will pay the foreman, the department head whatever his title, to check up his department according to this simple method of analysis. It wouldn't be a bad scheme to figure out right now—strictly for yourself—what rating you could honestly give your own department on each of these ten points. In doing so you will be checking yourself up after a manner, for of course the management of an organization is largely determined by the man at the head of it. But just as the self-analysis provided at the beginning of the Course was a good thing for you personally, so will the analysis of your department or plant on the basis of the actual results it is accomplishing, prove of value to you. It will point out the weak spots, indicate where your management needs strengthening, and suggest possible improvements.

Strengthen your ability to manage, and you put yourself forward in the most promising field of industry. The managerial functions offer the greatest opportunity for advance-

ment, simply because the men who can perform them are rare. Anybody can receive authority, can hand out orders, can manipulate systems. What is wanted by business everywhere is men who can *think* productively, who can *use* authority, who can get orders *executed* on time, who can make systems *work* without excessive expense.

The great need that exists for real managing ability was emphasized by E. A. Baker, head of the Industrial Service of the National City Bank of New York, in an interview in the magazine, *Printer's Ink*. Mr. Baker said:

"What this country needs in an industrial sense, needs at this moment more than anything else, is increased managerial ability. There is more production being lost through lack of efficient management than there is through lack of efficient labor. We require a man to serve a long apprenticeship of study and practical preparation before we allow him to practise law, medicine, or dentistry for the individual. We place our industrial undertakings in the hands of almost anyone—yet on our industrial enterprises depend not alone the individual, but the life and prosperity of the nation.

"We hear complaints of labor. There is no question that increased effort from labor

is highly desirable. But we have to take human nature as we find it. Disinclination to work is one of the basic traits of man. There may be a few who really do like to work, but the great majority would certainly prefer to get along without, or only work when they feel like it, and then only at what they feel like doing. On the other hand, it is equally true that practically all human beings are willing to work earnestly and conscientiously if the proper incentives are presented in an understandable way. It is up to management to recognize the conditions of labor as it actually exists and to arrange the conditions under which labor is to work and live, and the method by which labor is to be paid, in such way as to secure maximum effort. It can be done."

Other authorities have recently pointed out the great need that exists for men with managerial ability.

"I'm looking for the exceptional man," said a great industrial executive recently. "I can't find enough of them to fill all the jobs I have." What he meant by the

*Looking for the
Result-Getter*

"exceptional man" is the man who can take hold of things and get results, the man who can manage. That is the cry of business everywhere—the call for men capable of leadership. There may be

temporary set-backs in industry, but the general tendency is steadily upward and onward; and with growth in industry there will be an increasing demand for industrial leaders.

The men who will do the big things in industry in the next twenty-five years are mostly in the smaller executive jobs and in the ranks today. Who knew, among the hundreds who worked with him in the Connecticut wire mill back in 1880, that the husky young laborer, James Farrell, would be the executive head of America's largest industry twenty-five years later? F. D. Underwood was a brakeman in the Milwaukee yards a few years ago; now he is president of an important railroad system. The president of a great ship-building company was laboring as a riveter in the Brooklyn navy yard twenty-five years ago. History repeats itself. The future managers of American industry are, many of them, laboring in the ranks today. Many of them are just earning their spurs as foremen or sub-foremen, some are already climbing into the superintendent's job.

These men will climb as they apply brains and energy and fair dealing to the problems of industry, adapting modern methods to their own plant or departmental problems. They will climb as they apply brains and en-

ergy and fair dealing to themselves, to the development of themselves in the ten essential traits of a good production executive, as listed in Unit I. They will climb in proportion as they increase their skill in handling men, as they fit more smoothly into the complex organization of their plant, as they master and utilize records in checking up all their activities. They will climb as they more and more reject loose habits of thinking and working, reject guesswork as a guide to anything, and accept and apply throughout the scientific method. They will climb as they test themselves for results—always facing the facts whether the results show up favorably or unfavorably.

The good industrial executive is never a shirker, never a dodger. He knows that mental cowardice is quite as evil a thing as physical cowardice. Business wants men who will face the music, and not try to deceive themselves. That is why this Course starts with a system of self-analysis—because frankness and exact information are of the greatest importance and necessity in successful business. And that is why this closing chapter of the book stresses again the value of self-analysis, and suggests a method of analyzing your own management for its results.

Results count. Results are the measure of

your ability. Modern production methods are simply the tested methods of modern American industry which have everywhere been found successful in getting results.

QUIZ QUESTIONS

I

1. What is the definition of management, as given by Mr. Prentice?
2. In what way is the foreman more than merely the head of his department?
3. What are the three principles of management—the so-called “three eyes” of management?
4. What is meant by the scientific method?

II

5. How was the first step in the scientific method applied by the general foreman in the incident cited at the beginning of this chapter?
6. Name five general functions of management, as specified in this chapter.
7. What is the basic principle of all good management?
8. What is meant by the statement that “the scientific method is not a system”?

III

9. What principle of organization was being violated in the Dix Manufacturing Company, as related in this chapter?

- 10. Name seven principles of good organization.**
- 11. How do these principles affect human relations within the department or plant?**

IV

- 12. What is meant by the line type of organization?**
- 13. What is meant by the functional type of organization?**
- 14. How do the two types differ? What are the advantages of the line type? of the functional type? What are the disadvantages of the line type? of the functional type?**
- 15. What is the Taylor System? Name its four basic requirements.**
- 16. Are the two types of organization ever combined?**

V

- 17. What is system? How does it aid industrial efficiency?**
- 18. Into what two groupings may all work be classified?**
- 19. Name the four rules for system.**
- 20. Name three sources from which good system work is derived.**
- 21. Explain the twofold remedy for unwise systematizing.**

VI

- 22. Name and explain the four principles which underlie the theory of planning in production.**
- 23. What are the functions of a planning department?**

24. What are (a) stores issues? (b) tool lists? (c) work tickets? (d) instruction cards? How do these aid in putting work through the plant?

25. Explain how the lot system is operated.

26. Explain how the continuous-flow system works.

27. Outline a good policy to pursue with respect to spoilage and repairs.

28. What is salvage?

29. What is meant by stock and production control?

30. Name four classes of material that come under stock control.

31. Outline a requisition system for raw-stock control.

32. What three additional factors (besides stock control) are involved in efficient control of production?

33. What records are needed by the factory dispatcher?

VII

34. In what way does system depend on the human element?

35. What is meant by morale? How does it factor in management?

36. Name two main factors that affect the morale of a working force.

VIII

37. What is the commodity theory of labor?

38. What is the machinery theory of labor?

39. Why is it that either of these two theories, taken alone, is inadequate? What third point of view should be taken by the management in considering his labor problems?

40. What is the first essential to a good wage system?

41. How does the law of supply and demand affect wages?

42. Why should the foreman or other executive in charge clearly explain the wage system to his men? How does this help in the management?

43. What is meant by "suing the appeal to the man"?

IX

44. Why is it sometimes misleading to judge by appearances? What is the real test of a worker, of a system, or a management?

45. Name ten results that should show up in a plant under good management.

46. Explain this statement: "Management begins and ends with analysis."

47. Why is it valuable for the foreman or department head to check up the results in his department from time to time?

48. What probable future can the good team leader look forward to?

49. What are modern production methods?



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